Department of World Cultures
Greek Language and Literature
University of Helsinki

Outcome of long-term language contact

Transfer of Egyptian phonological features onto Greek in Graeco-Roman Egypt

Sonja Dahlgren

ACADEMIC DISSERTATION

To be presented, with the permission of the Faculty of Arts at the University of Helsinki,
for public examination in lecture room 6 (Metsätalo building),
on 3 June 2017, at 12 noon.

Helsinki 2017

ISBN 978-951-51-3217-8 (pbk.)
ISBN 978-951-51-3218-5 (PDF)

Helsinki University Printing House
Helsinki 2017

Cover image: OGN I: 42, The Cairo Egyptian Museum (pictures taken from the originals by Dr. Angiolo Menchetti).

Abstract

In this work I have studied the language contact situation between Egyptian and Greek in Roman period Egypt. I have analysed the language use of a corpus written by Egyptian scribe apprentices, OGN I, rich with nonstandard variation due to the imperfect Greek learning of the young scribes. I concentrated on finding Egyptian phonological influence from the misspellings of the vowels that displayed variation atypical for native language writers.

Among the nonstandard features were e.g. underdifferentiation of foreign phonemes, the reduction of word-final vowels, allophonic variation that matched Coptic prosodic rules, and coarticulation of consonants on vowels. All of these linguistic characteristics can be found also in the near-phonetic spellings of Greek loanwords in Coptic, which I used as parallel reference material. Studying the similarly phonetically-based orthographic variants in Arabic loanwords in Coptic from a later period gave me information on Coptic vowel qualities, by which I could confirm that most of the nonstandard vowel variation in the texts of OGN I was not related to Greek internal phonological development but Egyptian influence. During the project I began to suspect that there might have been an independent Egyptian Greek variety in existence, similarly to e.g. Indian English, with transfer features from especially the phonological level of Egyptian. I found enough conclusive evidence of a variety of this type to be able to continue research on it after the doctoral dissertation.

In order to be able to obtain knowledge of the spoken level of these languages which are no longer spoken, I used modern phonetic research as my aid, and especially concentrated on loanword phonology. I believe I have found enough evidence of the methods of integration of these loanwords and foreign words into Egyptian to be able to contribute to the ongoing debate about whether loan adaptation is based on the phonological level or the phonetic one. I found evidence of both, quite often working simultaneously.

Acknowledgements

I am in debt of gratitude for many people for providing help and assistance in a number of ways in writing this book; as the number of people whom I wish to thank is great, I may have forgotten someone in my rush and stress; do accept my apologies if this has happened, it does not mean your help would have been forgotten! I consider myself very lucky for having had such a wide and generous scholarly community on whose help I could always rely both in Helsinki as well as abroad.

First and foremost I would like to thank my opponent Brian Joseph for his many insightful comments and corrections that greatly improved the quality and accurateness of this work; I am especially grateful to him for keeping me on my toes about distinguishing between Greek internal development and Egyptian-induced variation. Brian made a great impact on me during the doctoral defence of my colleague Max Wahlström with his relaxed demeanor and easy academic conversation, as well as his great dancing skills at the afterparty. Second, I would like to thank my other external reviewer Sebastian Richter for his critical comments especially on the Egyptian/Coptic distinction; without his remarks the reader would have been left with a degree of confusion regarding e.g. the dating and existence of Coptic proper. Additionally, I would like to thank Sebastian for all the help given to me in the previous years in the form of providing me with crucially important references, including his own unpublished material, access to the DDGLC (Database and Dictionary of Greek Loanwords in Coptic, FU Berlin) project database, and preliminary comments on my analysis of the phonologically-induced nonstandard orthography in Greek loanwords in Coptic. This book would definitely not be what it is without his help; furthermore, I had the distinct pleasure of learning Chrismas carols in Coptic in the DDGLC Christmas parties into which I was invited – an academic skill not easily attained, nor forgotten.

Next, I would like to thank my supervisor Martti Leiwo. I have known Martti a long time, and he has an integral part in my interest in the topic as he suggested the material of Narmouthis Greek ostraca for my M.A. thesis and also supervised it. The writing of the M.A. raised more questions on the nature of the material than could be answered within it, and the project moved onward to the PhD level. It is therefore very clear that without Martti's contribution to my studies this book would never have seen the light of day. I would also like to thank my second supervisor Fred Karlsson for his impeccable professional touch; as he was already retired during the writing of this dissertation, I only met him a few times for advice but when I did, he managed to resolve an acute crisis related to the treatment of the material in addition to having put me in the right theoretical path from the very beginning.

I also owe thanks to Jaakko Frösen who has very kindly taken on the additional task of reading and commenting on my material from the very beginning of the project, also providing me with my very first funding in his project *Ancient Greek Written Sources* (a Centre of Excellence of Academy of Finland). Many valuable suggestions and corrections of his have found their way into this final version, and have ultimately made it that much clearer in e.g. terminology used.

I owe my most hearfelt thanks to my project colleagues Marja Vierros and Hilla Halla-aho for their myriad of comments, advice and peer support over the years. I am especially grateful to Marja for her phone service on papyrological information, often during the morning coffee break (in Finnish *kahvipuhelu*, lit. 'coffee call') - sometimes just a chat was needed, and always given. I would like to thank Hilla first and foremost for her efforts in helping me organise the structure of the work; Hilla is one of the master organisers in the world, and thankfully I could benefit from that.

I would most sincerely like to thank Carsten Peust, my main reference for Coptic phonology, for answering my many questions and giving me comments on my ideas. I am

equally grateful for the comments, advice, references, again including unpublished studies of their own, provided by Eitan Grossman and especially Anne Boud'hors; when I asked the papyrological community for references on Coptic phonology in my presentation at the Warsaw papyrological congress in 2013, Anne looked me up me after the presentation and told me to contact her after the congress for references. I am very thankful for this act of scholarly kindness on her part. I am likewise grateful for Geoffrey Horrocks for taking the time to meet me in summer 2013 to evaluate my preriminary results; an act of encouragement that was very much needed at the time.

Needless to say, during the course of one's academic career one is affected by many teachers, professors and colleagues. The inspiring Greek drama lectures provided by my former Greek professor Maarit Kaimio kept me interested in Greek even when it seemed like it was all Greek to me. I am also immensely grateful to my current Greek professor Mika Kajava for all his help with my studies over the years, and especially for being the fastest replyer to emails in the Western Hemisphere. Similarly, my wonderful fellow students, especially during the Greek study trip, have had a huge impact on me. Thank you especially Marja, Marja "Ritza" Oksanen, Miira Tuominen and Hilla for your company and friendship on that trip and through all these years.

It goes without saying that accurate data is important for a succesful dissertation and I am grateful to those who have helped me with it. I am most deeply indebted to the DDGLC project for letting me use their database for my work. Without the aid of analysed data in electronic form the compiling of nonstandard lemmata of the Coptic material would have taken me indefinitely longer. But more than that, not only was the project useful for my purposes, the project members always made me feel warmly welcome on my visits. I would especially like to thank Dylan Burns for outstanding academic benevolence and Frederic Kruger for many valuable suggestions for references and conversations on the Coptic language, and answering questions on Coptic and Egyptian grammar when the grammars available to me could not: Freddie's online Coptic support was priceless toward the end when time was scarce.

I am equally grateful to Joanne Stolk and Mark Depauw for letting me use the Trismegistos Text Irregularities test database for my phoneme searches. The incredible possibility of searches based on grapheme-phoneme correspondences throughout the vast material linked to the Papyrological Navigator provided the parallel analysis for Narmouthis Greek material in the Greek use of the whole of Egypt, the like I would not have had a chance to compile if done solely on my own. Due to time limitations, I would have had to satisfy myself to a selection of a few key corpora of Greek, within the scope of balanced geographical distribution in the attempt to form a picture of the Greek usage in Egypt as a whole. While this might have been a successful strategy, it would nevertheless have left a certain doubt over the analysis in the somewhat random nature of the corpora selected. I would also like to thank Erik Henriksson for the development of Paratypa, which further eased especially the coarticulatory searches needed for my analysis.

Many papyrologists and Egyptologists/Coptologists and papyrologists have been kind enough to grant me access to their unpublished material and answered many of my questions, as well as added to my references: thank you Emily Cole, James Cowey, Jenny Cromwell, Korshi Dosoo, Frank Feder, Colin Frederic, Silke Grallert, Benoît Laudenbach, Ivan Miroshnikov, and Luigi Prada – not all of the material so generously offered ended up in the final version but nevertheless broadened my understanding of the general situation of Greek-Egyptian language contact. I am very much grateful to Rosario Pintaudi, editor for OGN I, for sending me the new high quality digital pictures for some of the ostraca, and Angelo Menchetti for his kind assistance in this.

I would also like to thank my professors and colleagues at University of Helsinki who helped clarify the structure, linguistic terminology and methodology of my dissertation by

commenting on my work over the years: thank you Matti Miestamo, Petri Kallio, Kaius Sinnemäki, and Don Killian. I also wish to thank Riho Grünthal and Juhani Klemola for building up a great group spirit in our Langnet sub-programme *Language Variation and Change*, and the whole group as a whole for their many excellent comments, suggestions and general peer support; thank you especially Max Wahlström, Lotta Jalava, Iiris Rennicke, Timo Korkiakangas, Hanna Lantto and Heini Lehtonen for your great company, many laughs, and support in the more stressful periods.

During the early years of my doctoral studies, I had the pleasure and benefit of attending the doctoral seminar (Tohtoripiiri) of Classical philology, lead by Kalle Korhonen and Manna Satama, later also Marja Vierros. I learned a great deal in the meetings, and would like to thank the whole group: I especially want to thank Katariina Kankaanpää and Saara Kauppinen for their comments and friendship over the years. I am no less grateful for the comments and colleaguality received in the annual meetings of Martti Leiwo's doctoral students in Athens during the years Martti was the Institute director: thank you again Marja, Saara, Matias Buchholz, Vesa Vahtikari, Kimmo Koskinen, and Sanna Kittelä! Finally, I would like to thank my colleagues in Turku for their comments, references copied and sent, and company while I lived 'abroad': thank you Nobufumi Inaba for assistance with Japanese, and especially Ville Leppänen, Aleksi Mäkilähde and Tommi Alho for your help and continuing entertaining presence in my life.

I thank Langnet and Emil Aaltonen foundation for the funding of my research and travel grants that enabled me to participate in vitally important conferences, and University of Helsinki for the many travel grants to conferences and the dissertation finalisation grant. The final year of the work was funded by the Academy of Finland project *Act of the Scribe*.

I am most deeply thankful to my family for their help during the course of this work. My parents very kindly took care of my dog while I attended conferences and generally travelled in search of information on phonology and Coptic. My brother always helped in my dire technological needs and tried to answer even the more cryptic questions I had about them.

Last, but certainly not least, I would like to thank my boyfriend Seppo Kittilä for answering a million questions about linguistic terminology and text construction, making great cups of coffee and feeding me with good food when I was tired, and practically everything else under the stars over the years. More than anything else, I would like to thank him for the vast amount of genuine encouragement I received in times of doubt; it really made a difference.

I am fully aware that dogs cannot read, but nevertheless I dedicate this book to my dear dog Hippu. When there were times when nothing or no-one could make me laugh, she always managed. All scholars should have a dog like her to give them perspective, and take them out occasionally to throw a few sticks in the park.

10th May 2017, on a cold winter's night,
Sonja Dahlgren.

Contents

PART I: INTRODUCTION TO SUBJECT AND THEORETICAL FRAMEWORK

Abstract 3

Acknowledgements 4

Abbreviations, linguistic marking and referral forms 10

1. Introduction 13

1.1 Narmouthis collection 16

1.1.1 Nature of the material 17

1.2 Comparative material 18

1.3 Earlier studies 18

1.4 Research methods 18

1.4.1 Digital technologies 20

1.4.2 Contact linguistics in the study of classical languages 21

1.4.2.1 Writing from dictation? 23

1.4.3 Articulatory phonetics, phonological typology 24

1.4.4 Second language acquisition (SLA), second language writing system (L2WS) and loanword phonology 25

2. Language situation in Narmouthis in the 1st-3rd centuries CE 27

2. 1 Greek internal phonological development 28

2.1.1 Greek settlers in Narmouthis and the local Greek dialect 30

2.2 Egyptian varieties and the local Egyptian dialect 31

2.3 Coptic phonology 34

2.3.1 Coptic phoneme inventory and stress system 35

3. Impact of the mother tongue 41

3.1 Coarticulatory phonetics and phonological typology 41

3.1.1 Typology of vowel reduction 42

3.2 The effects of orthographic depth and second language writing system (L2WS) 44

3.3 Loanword phonology and second language acquisition (SLA) 50

3.4 Language attitudes 51

PART II: PHONOLOGICAL ANALYSIS OF THE NARMOUTHIS OSTRACA

4. Phonological analysis of the Greek in OGN I 53

4.1 Names 56

4.2 Consonants 58

4.3 Vowels 59

4.3.1 Reduction of unstressed vowels: /a, e, o/ 62

4.3.1.1 Confusion of /a, e, o/ in phonologically uncertain cases (with possible morphological background) 65

4.3.1.2 Confusion of /a, e, o/ in excluded cases (scribal errors) 66

4.3.2 Under-differentiation of foreign phonemes and allophonic variation: /o/u/y/ 67

4.3.2.1 Under-differentiation of foreign phonemes: /y, u/ 68

4.3.2.2 The phonemic quality of <y> 81

4.3.2.3 Stress related allophonic variation: /o/ and /u/ 83

4.3.2.4 /o, u/ variation with possibly morphological background 90

4.3.3 Greek phonological development in process and underdifferentiation of foreign phonemes: /i, e/ 100

4.3.3.1 Variation between ει <ei> and ι <i> 101

4.3.3.2 Variation between ι <i>, ει <ei> and η <ē> 103

4.3.3.3 Variation between η <ē> and ε <e> 105

4.3.3.4 Variation between ε <e> and υ <y> 106

4.3.4 Bivalency of Coptic *eta* 106

PART III: PHONOLOGICAL ANALYSIS OF THE COMPARATIVE MATERIAL

5. Supporting evidence for Egyptian influence 114

5.1 Greek loanwords in Coptic 114

5.1.1 Introduction of the material 117

5.1.2 Reduction of unstressed vowels in Coptic: /a, e, o/ 119

5.1.3 Underdifferentiation of /y, u/ and phonemic quality of Greek <y> 125

5.1.4 Stress-related allophonic variation /o, u (y)/ 128

5.1.5 Fluctuation of /i, e/ and the quality of *eta* 130

5.1.6 A note on Coptic stress 133

5.1.7 A note on language attitudes 138

5.2 Arabic loanwords in Coptic 142

5.3 Greek texts from other Egyptian areas 148

5.3.1 Evidence for reduction of unstressed vowels in Egyptian Greek: /a, e, o/ 150

5.3.2 Stress-related confusion of /o, u (y)/ 153

5.3.2.1 Underdifferentiation of /y, u/ and phonemic quality of <y> 154

5.3.3 Coarticulatory adaptation of /i, e/ in the process of front vowel raising and the quality of *eta* 159

6. Discussion 162

References and bibliography 169

Abbreviations, linguistic marking and referral forms

Phoneme qualities and their marking in transliteration

Greek *ypsilon* receives the grapheme <y> in transliteration when it is alone, and <u> when it forms a part of a diphthong, as has been conventionalised. Sometimes it can be seen that even single *ypsilon* is transliterated as <u>, but in this book I follow the convention of marking it with the phonemic representative it was since pre-Classical period in Attic, as is familiar from the Erasmian pronunciation model. Likewise, following the Erasmian pronunciation, ου <ou> is representative for the single phoneme /u/, but as is also a convention, it is in this book written with the diphthong when transliterated.

Even though vowel quantity in Greek had disappeared by the time period of this study, it is important to be able to distinguish between *eta* and *epsilon* as these had a different phonetic quality. These will be marked with a macron in Greek and a circumflex in Coptic (following the Leipzig-Jerusalem transliteration rules). Therefore in this book *eta* is marked as η <ē> *ē* for Greek and ⲏ <ē> *ê* in Coptic. The same system naturally applies for the marking of *omicron* and *omega.*

Conventions used for different levels of language analysis

<graphemic level> will be used for a grapheme-by-grapheme transliteration exactly as stands in attestation, nonstandard or standard. For example Greek πουρου is transliterated as <pourou>.

/phonemic level/ will be used to convey an approximation of the pronunciation of the spoken level. For example Greek πουρου is pronounced approximately /puru/.

[phonetic level] will be used for a precise pronunciation of a phoneme on the spoken level. For example Greek πουρου is pronounced [puˈru].

Italics

Italics will be used for the referral form after the initial introduction in font and graphemic level transliteration to allow for an easier narrative. This style will be used to talk about words under analysis unless the exact graphemic level is essential. When I refer to a word after I have introduced it in all the relevant layers, the nonstandard, the standard, the precise graphemic level and possibly the phonemic level, I continue referring to the same word in what is the conventional approximation of a transliteration in italics. This is in order to avoid unnecessary amount of running lines in examples as it is my wish to make the examples accessible to Greek scholars and other linguists alike; following this wish, the Greek font needs a transliteration after it, which easily becomes heavy and numbing for the reader after several repeats of the same attestation. For instance, *pourou* discussed in Section 4.3.2.1, will be treated as follows:

a) first introduced as nonstandard πουροῦ <pourou> for standard πυροῦ <pyrou>
b) thereafter referred to as nonstandard *pourou* for standard *pyrou*.

For Coptic, the Leipzig-Jerusalem transliteration convention developed by Grossman & Haspelmath (2015) will be used for the referral form. This is in many cases conducted following the same principle as is Greek transliteration, allowing for a few special characters relevant for Coptic only. The Leipzig-Jerusalem transliteration system is shown below.

ⲁ	*a*	ⲙ	*m*	ⲱ	*ô*
ⲃ	*b*	ⲛ	*n*	ϣ	*š*
ⲅ	*g*	ⲝ	*k*^{s}	ϥ	*f*
ⲇ	*d*	ⲟ	*o*	ϩ	*h*
ⲉ	*e*	ⲡ	*p*	ϧ	*x*
ⲍ	*z*	ⲣ	*r*	ϫ	*č*
ⲏ	*ê*	ⲥ	*s*	ϭ	*c*
ⲑ	*t*^{h}	ⲧ	*t*	ϯ	*t*^{i}
ⲓ	*i*	ⲩ	*u*	ϩ	*x'*
ⲕ	*k*	ⲫ	*p*^{h}	ϣ	*ç*
ⲗ	*l*	ⲯ	*p*^{s}	ϩ	*ç'*

Table 1. The Leipzig-Jerusalem transliteration convention by Grossman & Haspelmath (2015).

Glossing

Whenever there is need to code grammatical information in e.g. the translations, I have used the conventions of Leipzig Glossing rules.

Linguistic terminology

Variation from standardised language use, be it spelling variants based on the phonological level or morphological variation from the current standard grammar of the language, has been labelled with many terms in the past. In this book, when talking about language use deviant from the standard, I use the term *nonstandard*, first introduced by Trevor Evans (2010). Similarly, linguistic features used in one language that derive from the structures of another language (usually related to the second language use with features deriving from the first language) have been referred to in many terms, one of them *interference* from Weinreich (1953). Due to its possibly negative connotations, I use the term *transfer*, more frequently used in the field of second language acquisition studies.

Linguistic abbreviations

L1 = native (first) language
L2 = second language
SLA = second language acquisition
TL = target language
L1WS = first language writing system
L2WS = second language writing system

Translations

All translations for single words follow the standard basic meaning, i.e. the contextual special meanings have not been taken into account.

'Details'

Some sections include in-depth analyses that have been separated from the main text by indentation. These provide extra information on the matter at hand but have been separated from the text due to their highly theoretical character, in order to keep reading the chapters less taxing.

PART I: INTRODUCTION TO SUBJECT AND THEORETICAL FRAMEWORK

1. Introduction

By the second century CE, the time period of the Narmouthis collection, Egypt had been a bilingual state for hundreds of years (see, for example, Vierros 2012: 33-34 for a good description of the development of Greek language policy after the conquest of Egypt by Alexander the Great). The language policy of Egypt had been changed by the conquest of Egypt by Alexander the Great in 332 BCE, and as Greek was by the Roman conquest firmly established as the official language of the government and the Romans knew it well, they saw no reason to force Latin onto the already working system.

This societal bilingualism with two official languages, Demotic Egyptian still used for some aspects of the administration (for example the mummy labels) and Greek alongside it had many forms, as it does still in our age in any bilingual state. On the one hand, there was the upper class Greek elite, along with some upper class educated Egyptians, who according to Fewster (2002: 242) probably spoke Greek on a daily basis and probably quite fluently. On the other hand, there were many people who probably did not speak or write Greek at all[1] but had to rely on friends or professional scribes to deal with paying taxes or for private correspondence, to name but a couple of examples for which one had to be able to write Greek.[2] The Demotic script was so difficult to master that few knew how to use it, causing even Egyptian scribes to increasingly write in Greek from the later Ptolemaic period (1st century BCE) onward (Bagnall 1993: 235-238; Fewster 2002: 225-226: Richter 2009: 415).

Thinking logically, most of the Greek illiterate population must have consisted of the inhabitants of smaller villages, although compared to e.g. comparative data from medieval or early modern Europe where the presence of literary works in villages was practically non-existent, surprising amounts of Greek literature have been found in the villages of Fayyum. This is probably related to the fairly strong presence of Greeks in the Fayyum villages. Due to this, some of the (Egyptian) inhabitans of the villages may have been more in touch with the Greek culture, through the schools or gymnasia, than they otherwise would have, although this seems an insufficient explanation for the large variety of literary texts found. According to van Minnen, these literary works were owned also by other than the elite i.e. priests, local officials and (Roman army) veterans; however, certainly the presence of the elite and especially the temples with their priests contributed to the variety of literature greatly, both in Egyptian and Greek (van Minnen 1998: 100-101; 108-112).[3]

---

[1] Bagnall speaks of 'most people' having been illiterate (Bagnall 1993: 237).

[2] Tax receipts were still issued in Demotic in the Roman period albeit in ever decreasing numbers with only a handful after the middle of the 2nd century CE; the last ones come from around 235 CE (Bagnall 1993: 236-237).

[3] Having said this, van Minnen further hypothesis that farmers and peasants were unlikely to be able to read even the documents they owned and signed in most cases; this is based on the frequency illiteracy is mentioned in relation to these types of contracts. It therefore seems equally unlikely that they owned literary texts, perhaps excluding gentleman farmers who only spent part of the year on their estates. Furthermore, in e.g. Karanis, literary texts have also been found even less frequently than documentary ones. To give an idea of the quantities, Tebtynis has the most literary texts on van Minnen's "Top 10" list of villages with literary texts: 94 Greek ones (although 23 are uncertain), 138 Egyptians (also some uncertainties), and 1 Greek-Egyptian one. Kerkeosiris,

Taking all of the above into account, the issue of how many Egyptians actually were able to read and write Greek in the Roman period escapes any reliable estimations (but see evaluation of the level of societal bilingualism of Egypt in the Ptolemaic period i.e. before the Roman period in Vierros 2012: 39-53). It is still likely that in between the lowest classes and the wealthy were the (probably) middle class people who could speak and write Greek to varied extents,[4] including the professional scribes who had to be able to do so for work. These scribes and their language use are the focus of this study.

Bilingualism showed in many respects in Roman Egypt, probably in no way differing from the practices of bilingual states of our age. The written evidence of diglossia is, perhaps, the most easily visible of the many manifestations of the language situation; The Rosetta Stone from the Ptolemaic period can be named as one of the most famous examples in the world for this. In bilingual mummy labels, for instance, it was regular to have only the so-called statistical information in Greek, i.e. the name, filiation, occupation etc., whereas in the Egyptian text there was, in addition to this information, some religious content. Likewise, in some tax receipts, there might be the payer's or scribe's name only in Greek and the rest of the information in Egyptian. The idea behind these examples is, perhaps, that the person processing the documents could possibly only read Greek, and with the relevant person's name in Greek could file the documents correctly (Fewster 2002: 229-230).[5]

Along with diglossia, there were doubtless many other elements to the language situation, among these the eternal question of how deep the competence of the supposedly bilingual scribes really was. One has only to look at the current global situation with English as the major dominant language of business and commerce to understand that many people using English on a daily basis often have a very limited knowledge of the language – they might write it well, if that is required in their line of work, but speak it poorly, or they, in some cases, have serious problems even with the writing regardless of the fact that they do so every day. How can this be? Individual language competence is one factor, of course, and language tolerance is another. If the person at the receiving end of the message understands it regardless of its occasional lacking in correct grammar or a few spelling mistakes, it is unlikely s/he will start correcting the language of the sender of the message. After all, what would be the point, if the issue at hand is not the learning of English? It is equally possible that both of the correspondents have a poor grasp of English grammatical and spelling features and are only using it for communication because it is the only common language between them.

---

near Narmouthis, has 2 Greek ones, nothing more. Narmouthis is in the middle part of this list with 16 Greek texts (1 uncertain), 19 Egyptian ones, and 1 Greek-Egyptian. The literature found in Narmouthis includes e.g. Homer, Isocrates, NT Luke and Paul, and Vergilius in Latin. (van Minnen 1998: 112-114; 137-141).

[4] Bagnall & Cribiore (2006: 43; 45), although concentrating on women writers only, paint a vivid picture of the wide spectrum of the different hands belonging to this "middle group" of writers by categorising the hands as ranging from nearly as good as some secretarial hands, i.e. nearly on the level of professional writers, to "evolving" and even merely "alphabetic".

[5] On p. 230 Fewster provides for an example of a bilingual mummy label (translation here only):

Apollonios the younger (son) of Besas the elder, mother Thaminis, priest and however he is styled.	His soul will serve Osiris Sokaris great god, lord of Abydos Apollonios the younger son of Bes the elder (son of) Senminis, the priest, the scribe.

On p. 229, there is evidence of a bilingual tax receipt:
(Demotic, 1st hand): Senpamonthes, daughter of Harsiesis, has paid to the granary in year 24 through Phthoumonthes, son of Khonstefnakhte, 1 1/8 (artabas of) wheat/ 4 1/-24 1/48 / 1 1/8 (artabas of) wheat again. They are received. Signed Pamonthes son of … in year 24, Pauni 22.
(Demotic, 2nd hand): Signed Plenios son of Kalasiris, in year 24, Pauni 22.
(Greek, 3rd hand): I, Dionysius, have signed.
(SB xvi. 12409 (Medinet Habu, 6 BCE)

At the other end of the scale, there are multilingual societies, such as India, where people use more than one or two languages.[6] A situation where one might regularly use several different languages, one for home, another for work, a third one for shopping, a fourth one to watch television, for example, is a living reality for some people in India, this linguistic system starting already for a child with a school education of, quite often, three languages (Mohanty 2006: 236; for languages in school education, p. 272 onwards). Everyday realities such as these create linguistic geniuses able to switch between languages on a moment's notice (Mohanty 2006: 265), even if they might in some cases lack the ability to write all, or, in fact, any of these. Egypt in the Roman Period was and had for a long time been a multilingual society with many (former) languages such as Nubian, Carian, Aramaic, Persian and the latest, Latin, and it is more than likely that all of the examples above were well represented in the society. However, as we are only dealing with written material of language users long gone, it is impossible to give any certainties about anything, and this leaves us at the mercy of theories and suppositions. It is therefore impossible to say anything definite about the level of bilingualism of the scribes and that is not the purpose of this work; this being said, it is, however, possible to give concrete examples of the language contact situation at hand and of the transfer elements of the scribes' first language (L1) sieving through to their second language (L2), Greek.

The main focus of this study is to provide a linguistic analysis of the many orthographically nonstandard writing forms of the texts in OGN I (*Ostraca Greci da Narmuthis*), especially concerning vowel orthography as this is in many cases a far more complex issue than the nonstandard spelling of consonants, involving, quite often, multicausality. It seems that the many nonstandard vowel writing forms may result from the impact of both L1 i.e. Egyptian phonology as well as the first language writing system (L1WS) of the writers, therefore this hypothesis is explored in the linguistic analyses in Chapters 4 (Phonological analysis of the Greek in OGN I) and 5 (Supporting evidence for Egyptian influence). This opinion is supported by first examining the effects of language contact on a general level as well as clarifying how this can be applied to the study of Classical (i.e. dead) languages in Section 1.4.2 (Contact linguistics in the study of classical languages). To strengthen the basis of my analysis, in Section 2.3 (Coptic phonology) I give a description of the structural differences between Greek and Egyptian that cause certain types of errors to occur in the scribes' writing; in Chapter 3 (Impact of the mother tongue) I also provide explanations as to why the phonetic level of the language might affect the written script. In Chapter 4 I analyse the nonstandard language usage of the Narmouthis ostraca, and to investigate the L2 Greek usage of the Egyptian scribes in a broader language contact situation, the language use of the Narmouthis scribes will be compared to the nonstandard writing forms of Greek loanwords in Coptic in Section 5.1 (Greek loanwords in Coptic), and to the Greek usage of Egyptian scribes from other regions in Egypt in Section 5.3 (Greek texts from other Egyptian areas). The phonological level is the main point of concentration because it explains much of the nonstandard spelling, a point of study which has until this been sadly under-represented when looking for answers to the seemingly substandard level of the scribes' Greek spelling competence.

One of the main challenges in this work is to maintain the division between nonstandard writing forms caused by Greek internal phonological development and those caused by transfer from Egyptian. This will be paid special attention to through a thorough qualitative analysis of each feature, taking both languages' phonological systems into account, with examples provided from the database collected of the material. In addition to the linguistic analysis of phonological transfer features, attention will also be paid to the sociolinguistic situation of

[6] The 1961 census reported 1652 mother tongues, classified into 300 to 400 languages from five language families. Mohanty 2006: 262.

Roman Egypt in general, also to the ever-intriguing question of the level of bilingualism in Egypt. This will be examined in Chapters 3 and 4.3.2.1, using second language acquisition (SLA) and language contact studies as framework, especially focusing on the issues of functional bilingualism (see e.g. Hoffmann 1991: 16–17 for a broad definition of different types of bilingualism) and individual language competence, a topic which has previously been by and large ignored in the study of classical linguistics but which has gained more interest in the recent years. Good examples of the contributions of this new line of research are seen in the books *Bilingualism in ancient society* (James N. Adams, Mark Janse & Simon Swain (eds.)) and *Language of the papyri* (Trevor V. Evans & Dick D. Obbink (eds.)). It is along these lines that I aim to approach the question of language contact in my work. The topic of language attitudes will also be briefly addressed in Chapter 3, again in reference to similar linguistic situations in the contemporary world.

1.1 Narmouthis collection

The Narmouthis collection consists of, as far as is published by now, all in all 1555 *ostraca* i.e. potsherds, of which ca. 500 are Greek-only, ca. 600 Demotic-only, 350 are Demotic-Greek bilingual and 70 Greek-Demotic bilingual. The main focus of this work is the language use of the 133 Greek texts of *Ostraca Greci da Narmuthis* = OGN I (1993). Most of the collections of ostraca of this sort found in Egypt consist of name lists and receipts, but the Narmouthis collection is very varied in its contents: it is a collection rich with many types of documents, e.g. petitions, tax-receipts, horoscopes etc., and also texts that are assumed to be school exercises, such as name lists. The collection was found in an Italian excavation in 1938 in the University of Milan expedition (years 1934-1939 and from 1960's onwards), in a Ptolemaic temple storage room in two storage jars (Bagnall & Rathbone 2004: 143). The dating of the texts in the Narmouthis collection, including the Demotic Egyptian text editions of ODN (*Ostraca Demotici da Narmuthis*) and OMM (*Ostraca Medinet Madi)*, range from the second century CE to possibly the beginning of the third; the dates mentioned in the texts concur with the reigns of Antoninus Pius (OGN I: 78 has the years 1 and 16, i.e. 137-138 CE, 152-153 CE) and Commodus (ODN: 27 mentions the year 32 i.e. 191-192 CE and texts 1, 2, 7 and 16 refer to the year 27). OMM mentions Trajan (OMM inv. nr. 1370) and Hadrian (OMM inv. nr. 680, 7-9) and, again, Antoninus Pius (OMM inv. nr. 1370 and 1371). Several Egyptian prefects, strategists and epistrategists have been mentioned, taking us as far as 199 CE (Pintaudi & Sijpesteijn 1993: 11 – 12).[7]

The texts are written mostly on the rounded surface and vary in size and shape. The surface might have been smoothed to make it an easier writing material but there were, for instance, no marked lines; this is relevant with regard to the collection having been categorised as school texts, the topic of which will be addressed in the next section (see Cribiore 1996: 75-96 for the criteria regarding school texts). Some of the longer texts have taken more than one ostracon (Pintaudi & Sijpesteijn 1993: 17).

[7] Among the prefects, epistrategists and strategists are such persons as the prefect M. Sempronius Liberalis, active in sevice 154 – 159 CE, the epistrategist Flavius Valens from 179 CE, and the strategist Anubius from 199 CE.

1.1.1 Nature of the material

The collection of Narmouthis Greek texts has been considered as one of school exercises, or of belonging to a school environment (Bagnall 2007: 21; Fewster 2002: 235). Some of the texts do, by their form, indeed fit into the category of school exercises, but more than this, the nature of the texts in the collection was presumed to have their origin in the school environment due to the many orthographically nonstandard writing forms (Bagnall 2007: 21). It is my opinion that although some of the texts might be school exercises, e.g. some of the name lists and possibly one concerning a geographical location, most of these texts do not really fit the category. Regarding the name lists, to start with, the use of a genitive in many of them rather seems to indicate to the transfer of goods or money from one person to another/an institution, and thus, probably means they are tax receipts. In addition to these, there are some abbreviations for horoscopes, petitions, bills, decrees, notes in relation to bills or deliveries, provisions regarding the priests in the temple etc.[8] It is certainly possible that the writers were indeed not professional scribes but they might have been scribe apprentices; as Bagnall remarks, their handwriting does seem "generally of a good standard -- little that is truly at a beginning level and much that is fluent". Bagnall sees the handwriting more as that coming from experienced writers of private letters (Bagnall 2007: 16-17). The editors of the collection, Pintaudi & Sijpesteijn, are of the opinion that the texts are drafts of documents later to be rewritten properly, written by scribes in poor command of Greek (Pintaudi & Sijpesteijn 1993: 13).

One could wonder why all these documents, apparently representing different areas of service of a life in a temple environment, were found together, but perhaps it is best to accept that during almost two thousand years, many things can happen to ancient storage places. I will, however, leave this issue with one last note: the fact that the documents were found in the storage jars probably says something of their function, as this was a common way of keeping tax receipts (Alston 1995: 8). Depending on the organisational skills of the priests or later users of the temple space, it is naturally also possible that everything ever written down was put together in one storage space and the collection really consists of a bit of everything from school exercises to professional tax receipts.

Be the nature of the texts as it may, from the point of view of this work it is not really relevant what the exact nature of the texts was, or whether the writers of them were professional scribes or not. They have been chosen as the point of focus because of the wide range of nonstandard orthography they contain. It might well be that the writers were scribe apprentices with a reasonably good penmanship but still with meager Greek skills. This is an advantage here as it is precisely the assumed lesser level of education in Greek that allows for the transfer of their native language to seep through, revealing features of Egyptian phonology in their treatment of the second language Greek.

---

[8] The Narmouthis ostraca have also been seen as school exercises because of the usage of ostraca for writing material, which was a common practice in the school environment, but certainly not limited to it. Cribiore, for example, mentions the regular usage of ostraca for tax receipts in Cribiore 2001: 151. She also comments on using ostraca for astronomical and astrological texts in Cribiore 1996: 63. Muhs gives an account of the form of a tax receipt: tax receipts written on ostraca were very simple. They had the name of the payer, the sum being paid, reason for the payment, name of the scribe, and the date. They did not usually have the name of the recipient or the sum being paid to or other details. (Muhs 1992: 249 – 250).

1.2 Comparative material

For comparative and supportive material for the phonological analysis of the Narmouthis ostraca, I use the nonstandard variation found in Greek loanwords in Coptic which displays similar phonological transfer phenomena. I also believe that several hundred years' duration in the language contact situation could not have existed without leaving any traces of it on both languages; rather, I believe it very likely that a variety of Egyptian Greek with features from Egyptian developed, much in the same way as the many World Englishes today. Therefore, to show that the language use so clearly affected by the contact with Egyptian in Narmouthis was not a local variety, I give examples of the same kind of variation in other Greek corpora found in Egypt. The parallel comparison of the many similarities in Greek loanword usage in Coptic and the variation found in Greek texts written by Egyptian writers will also show that although Greek vowel raising may cause ambiguity on the analysis of the variation in many cases, there are linguistic markers throughout the nonstandard realisations found in both sources to be able to distinguish Egyptian influence as a major factor besides the Greek internal developments.

1.3 Earlier Studies

There has been little research regarding the nonstandard vowel usage in Egyptian Greek texts. Gignac (1976) compiled all the nonstandard graphemic attestations for Greek vowels, grapheme by grapheme and phoneme by phoneme. This is mainly a list of all the possible nonstandard variants and contains very little and only very careful speculation regarding the reasons behind all this variation; Coptic influence is mentioned in passing in the introductory chapter (Gignac 1976: 55) and in some sections regarding the (from the point of view of Greek internal) most unlikely vowel changes, such as confusion of /y/ and /u/. In Gignac (1991), he more firmly states Coptic phonological influence as a factor behind the nonstandard spellings, mentioning as one of the reasons the underdifferentiation of those Greek phonemes that were not existent in Coptic (Gignac 1991: 186-187).

Horrocks 1997 (2nd edition 2010) was a major contribution toward studying the Greek-Egyptian language contact. Horrocks (1997), for the first time, mentions Egyptian substrate effects as a reason for the nonstandard graphemic variety, alongside the effect of the native Greek dialects brought to Egypt by the immigrants. Horrocks provides a thorough analysis of the different variants, excluding the effect of Greek internal development wherever possible (Horrocks 2010: 166-188).

The Narmouthis collection has previously been studied from a linguistic point of view by Fewster (2002), Leiwo (2003), Bagnall (2007) and Rutherford (2010). All four mention bilingualism (Fewster & Leiwo), imperfect learning (Fewster, Leiwo & Bagnall) and (future) Coptic grammatical structures (Rutherford) as reasons behind the spelling errors produced by the scribes, but none comment on the effect of the phonological level on that of the orthographic. This level of language use will be analysed in this book, with some preliminary remarks presented in Dahlgren (2016a) and Dahlgren (2016b).

1.4 Research methods

Although all language contact situations are by nature sociolinguistic situations, in this work the focus does not lie so much on why or in what circumstances the Egyptian scribes wrote

Greek, whether they were motivated to do so or rebelled against it. For practical reasons, they did so, and I am trying to find out why there was nonstandard variation in their production of it, from a purely linguistic point of view. Therefore I concentrate on whether the source of variation was Greek internal phonological development or the impact of the mother tongue of the scribes, Egyptian, or both. Furthermore, I aim to find out which features from both sources might be causing certain types of variation i.e. whether it is the level of phonemes or prosody, for example.

An interesting parallel for this study can be found in a Scottish English variation study performed by Lawson, Scobbie & Stuart-Smith (2013: 198-210). There is a two-way distinction between vowels in the words *fir*, *fur* and *fern* by speakers of lower class, but not by the middle class speakers, for whom there only exists one vowel quality for all of these allophones, schwa. It has traditionally been seen that middle class in Scotland pronounce these vowels as schwa for prestige reasons, mimicking the Received Pronunciation (RP) i.e. the so-called (nowadays) Queen's English. However, when tests were done, it turned out the bunched /r/ caused these vowels to centralise, hence the same pronunciation for all positions. So, the presupposed cause for this sound change remains a social one, as bunched /r/ is an imitation of the RP, but the vowel phonemisation is a mere coarticulatory factor and therefore a byproduct, and a misunderstanding in previous studies focusing on the vowel quality rather than the different quality of the /r/.

The same kind of reasoning as cited above can also be applied to Greek usage in Egypt. It has previously been thought that nonstandard grammar was caused by inadequate language learning, and that especially vowel usage was random, even though some systemacity could be seen in the interchange of voiced/voiceless stops. However, even though imperfect Greek skills may be the factor behind so much nonstandard variation, the reason for the outcome lies in transfer of the L1 phonology. Therefore, again, inadequate language learning is in fact the reason for at least in the beginning of nonstandard variation, but on phonemic level it is on closer inspection not random: it is caused by employing Egyptian phonological rules in the second language Greek usage. This variation may have with time grown into a legitimate Greek variety of its own, spreading into the broader population of L2 Greek users, and onto the later generations.

The investigation of this regarding a contact situation of two dead languages was not an easy task, however, as the study concerns the level of the spoken language with no language speakers available for interviews. I have therefore tried to combine text linguistics with modern phonological and phonetic research, as well as using both a linguictic approach in analysing the general outcome of the data, as well as philological skills to gain an in-depth knowledge of the two phonological systems. Moreover, I follow the human-oriented research attitude of Janda & Joseph (2003). Richard D. Janda & Brian D. Joseph cite some of the literature and trends among the field of language change studies and bring forward e.g. the trend of treating languages like biological organisms and change in languages as something evident comparable to a biological process, always following the same set of rules. Janda & Joseph discard this notion and rather think that it is essentially the human speakers that are the plausible agents of change in languages. In the words of Janda & Joseph (paraphrasing a quote by the former Confederate General George Pickett on the losses in the Battle of Gettysburg, on blaming the Union Army for things ("I think the Union Army had something to do with it")): "we think speakers have something to do with it" (Janda & Joseph 2003: 7-10).

I am inclined to follow this notion, and indeed this person- and individual- oriented approach is at the heart of my study of nonstandard Greek in Graeco-Roman Egypt. Furthermore, it is precisely the amount of individual variation, and that provided by many different individuals that has allowed me to form a general picture of the features of Greek usage in Egypt.

Because there is limited knowledge of especially the phonology of Egyptian, particularly the stress system of it, evidence is drawn form a number of phonological and phonetic studies of modern languages that have similar phenomena. Therefore, especially articulatory and acoustic phonetic research is used, as well as studies on loanword phonology.

In addition to using data for modern languages' phonetic research, the development of digital humanities has greatly enhanced the possibilities of obtaining reliable and realistic results instead of much speculation. As in the phonetic study of Scottish English vowels, modern technology has been an invaluable aid in getting nearer to the source of the variation in this study as well. The surge in Digital Humanities in the last few years has made much of this possible in providing even text linguists of dead languages with tools that make it possible to process the data as if the languages were still spoken with many available informants. With the help of the digital tools, I have been able to treat and analyse Greek and Coptic like the living languages they once were.

1.4.1 Digital technologies

The material for Greek loanwords in Coptic, used in Section 5.1 as parallel comparison for the Egyptian-influenced phonological features evident in the Greek ostraca from Narmouthis, has been collected from the database of the project Database and Dictionary of Greek Loanwords in Coptic (DDGLC, FU Berlin). DDGLC has marked up orthographic variants in the database, which created a wonderful opportunity for my research as many (maybe even most) Coptic editions contain little by way of corrections or analysis of nonstandard forms - often, only the Greek original can be found in the indices, but no mention of the Coptic standardised version of this, which is a necessary starting point for an analysis of nonstandard variants, especially when analysis touches upon possible dialectal or individual language use and is looking for general tendencies of the Egyptian linguistic system.

Without this aid collecting a sufficient amount of evidence would have taken infinitely longer, or it might have been necessary to limit the study to some of the more frequent phoneme replacement as indicated by e.g. Girgis (1966). This would have been a much more vague and partly an insufficient approach especially in terms of studying the possible transfer of Egyptian prosodic system on that of Greek in Egypt. The DDGLC project to have gone through the trouble of tracking down standard forms and marking down orthographic variants is an admirable service to people interested in the line of study such as my own, especially since the focus of the project is not phonological but the semantic change of the loanwords. Having free access to a tool like this has been an advantage that made it possible to study the Coptic stress system, a difficult and understudied subject, but highly important for the study of phonological transfer.

Likewise, it has been a privilege to be able to use the preliminary version of the phonemic search engine of Trismegistos (TM) Text Irregularities Database created by Mark Depauw and Joanne Stolk, as well as the later developed search engine Paratypa with slightly different technology created by Erik Henriksson. Before this, there was no way to perform phonemic searches for Greek material and therefore studying phonological development, variation and L2 Greek usage has been insufferably slow and by force of nature of the study, limited to e.g. using certain test words of sufficiently frequent use through the use of the Papyrological Navigator (PN) (examples of this method shown in Section 5.3).

While the use of test words and analysing a few select corpora with the typical phonological phenomena of the Egyptian Greek has still been used as the main method of phonological analysis in this study, this type of research can only give general tendencies and is largely dependent on people using the same type of vocabulary in different contexts, time

periods and dialectal areas/micro communities (such as scribal communities and military garrisons). Put another way, it leaves more room for doubt than is comfortable. Therefore being able to do searches based on phoneme replacements such as would be typical of L1 Egyptian Greek users has been invaluable for verifying the research results, because this is in no way tied to the choice of preference for lexical use, dialectal/regional variation, nor prestige effect or lack thereof (test words need predictions as to the precise form of spelling variants, and some things are bound to be missed using this methodology). Where there has been Egyptian influence on Greek, be this by direct contact of an L1 Egyptian writing L2 Greek, or language users of other than Egyptian origin using a form of L2 Greek learned in Egypt, the evidence of Egyptian impact can be seen on the phonemic level and never missed on account of low or no usage of a given test word.

1.4.2 Contact linguistics in the study of classical languages

Studying language contact between two dead languages can for a good reason be seen as difficult, especially from a phonological and phonetic point of view. There is no way to interview the language users about the nonstandard variation occurring in their language use, and relying on textual evidence alone can be problematic for a variety of reasons. How sure can the researcher be of the identity of the writer of an ancient piece of text? If one is aimed to clarify certain features of a specific language user, identifying hands is of crucial importance, to start with. This can be difficult as trained scribes used professional writing techniques and hands, often very similar in style to one another (see e.g.Vierros 2012: 91 and onward). Another point of departure for this line of research is an in-depth knowledge of the languages in question. Regarding transfer elements from one language to another, a careful division must be made between features possible to result from language-internal development and those clearly foreign elements seen to come from contact with another language - it is not as simple as taking elements language historically not being able to come from L1 development to automatically be transfer features from L2. Simple mistakes can happen, and some features can be a product of inadequate language learning without necessarily being direct transfer from L2 (more on this in Chapter 3 on Interlanguage). This, of course, means that the researcher of such a language contact has to master both languages to a sufficient level. With text languages this is both difficult and easy; difficult, because a long period of language history has to be taken into account on a very theoretic level, and easy because there is a limited amount of material to be taken into account, and the development of the language has stopped.[9]

To take a more practical approach, however, the phonological level of the ancient language users can be seen in their orthography. This is in no way dissimilar to the situation of modern English or French or, in fact, any other deep orthography[10] with a gap between the correspondence of the spoken and written level. As native English speakers might write <there's> when they mean *theirs* or other words with similar pronunciation but different

[9] Strictly speaking, of course, the development of Greek is still in process in the form of Modern Greek, but does not concern this study as the relevant phonological development was already in process in the Roman period and reached its peak before modern era. This development has been thoroughly analysed by, for instance, Horrocks (2010 (2)), and before that by Teodorsson in (1977).

[10] The term 'orthographic depth' refers to the level of grapheme-to-phoneme correspondence of a language. Finnish is often given as an example of a shallow (regular) orthography, the correspondences being direct and guided by very simple rules; English, at the other end of the spectrum, is a typical deep (irregular) orthography (Aro 2004: 9, and more in Section 3.2).

meanings, such mistakes might be made by the ancient Greek native writer when facing several different graphemes to depict the phoneme /i/, for instance. Examples such as these are probably numerous in languages modern and ancient. All in all, structurally speaking there is nothing in the ancient Greek or Egyptian languages not present in languages of the modern age, as can be further evidenced by the modern day language contact between English and Arabic, for instance: an Indo-European language with a deep orthography colliding with an Afroasiatic, consonant-rich[11] language not using vowel graphemes in the written text.

The similarities between this language contact and that between Greek and Egyptian are striking. The modern Arab writer has serious problems in trying to write down English vowels for a multitude of reasons: the inexperience of writing vowels, to start with, the L1 focus on the quality of consonants rather than on the vowel sounds, the effect of L1 phonology with the lacking of some vowel phonemes present in English but not Arabic[12], the possible inadequate L2 acquisition, and all of these combined with the orthographic depth of English and its many effects on especially the vowel orthography. Below is a beautiful example (1) of an Egyptian person writing English text messages, with many or possibly all of these factors in effect. The text messages regard an installation of a satellite antenna on the balcony of the Egyptian Arab's neighbour, Dr. Martti Leiwo, as the reception was not sufficient on the balcony of his own.

(1) Text messages written in English by an Egyptian Arab.

Text 1. (SMS, 31 August 2006)
Hi ihope you are fien. Please have look in your balkone the stalit man he forget thamsing, & he witanig 4 my answr.

Text 2. (SMS, 1 September 2006)
Hi please tray to move the desh aletal bet daun and ragth. Ihope you are ok and at home.[13]

The writer of these text messages has learnt English by speaking and thus writes mainly phonographically, i.e. by trying to guess which graphemes might match with the idea of the sound he has in his mind (Leiwo 2010: 116). He has learned the correct orthography by heart for some words in English as is clear from words such as *you*, *are*, *please*, *look* etc. There is also some very nice phraseology on the fluent greetings and the usage of *please*, as well as in the short prepositional phrase *at home* instead of, for example, 'in home', a common mistake for many Finnish L2 English users, for example. These examples put aside, however, it is also evident he is struggling with vowel orthography in general, especially in the marking of /i/, which can, in English, take many forms.[14] Take, for instance, *balkone* 'balcony' and *desh aletal bet* 'dish a little bit', where all of the /i/ phonemes have been written with <e>, one of the graphemes this can be done with. This is something the writer has clearly learned somewhere and taken to be the general rule for depicting /i/ in English. Compare these to *hi, ihope* 'I hope' and *tray* 'try' and *fien* 'fine' where he is less secure in how to turn /ai/ into graphemes – some he has learned by heart (*hi, I*, very common words) whereas *tray* and *fien* are guesses, half phonetic and half based on the knowledge that sometimes /i/ can be written with <y> or <ie>.

[11] The term by Maddieson (2013) will be explained in Section 4.3.1.
[12] Standard Arabic only has three vowel sounds: /a, i, u/, although regionally there is variation especially concerning the allophones of these (Ryding 2005: 25).
[13] Example in Leiwo 2010: 115-116.
[14] More in Section 3.2

Daun ‘down’ is a phonetic guess, as is *tray* [trai], and these vowels do occur in the writer’s L1, Arabic, so they are familiar to him; /i/ is, of course, one of the vowels in standard Arabic, but instead of always using the grapheme <i> for it the writer varies, as he knows the marking of /i/ to be a bit more complicated in English, a factor speaking for at least some training in written English. One can only guess what has been going on in the writer’s head with the words *thamsing* ‘something’ (the elements are in metathesis, <samthing> would have been a clear-cut example of the writer’s phonetic writing style), *stalit man* ‘satellite man’, *witanig* ‘waiting’, *answr* ‘answer’ and *raght* ‘right’, but whatever has happened to the vowels in these words, one thing is clear: loyal to the consonant-rich structure of his mother tongue, the writer never forgets the consonants in the words, apart from the small mishap of writing a double consonant with a single one, perhaps. The consonants are even always in the right order.

The examples are similar to the ones analysed in Chapters 4 and 5, which is hardly surprising: Greek was an Indo-European language with a deep orthography, and Egyptian a consonant-rich Afroasiatic language with no vowel graphemes in use before Coptic.

1.4.2.1 Writing from dictation?

It is commonly thought that people in antiquity read out loud, even when they were doing it alone by themselves, and that the many orthographic errors were a result of either the writers themselves speaking out loud or writing from dictation. While there may be some evidence for this and it might have added to the level of phonetics playing a part, orthographic errors are too often taken as evidence for dictation (see e.g. Bagnall’s (2007) appraisal of the nature of the Narmouthis scribes’ spelling mistakes). There is no reason why the so-called phonetic spellings should not take place when dealing with a deep orthography even when writing is silent, as witnessed by similar nonstandard language usage by native Greek writers both in antiquity and today, as well as e.g. English and French nonstandard spellings, which are always phonetic in nature (see Royce 2008: 83-84 and a similar minded quote from Gignac (1989: fn57) about most of his students’ mistakes being of phonetic nature; Royce also provides with a good bibliography about the subject of phonological factors affecting writing, and the studies regarding writing from dictation in Royce 2008: fn 57-67).

Further to the point, Skeat (1957: 207) points out that scribes could either commit visual errors through misreading the exemplar when copying a passage or repeat the visual errors made by the person dictating; they could also produce audible errors through faulty hearing when being dictated to, or write down phonetically through self-dictation. In other words, the style of the scribal work does not seem to have made any difference regarding nonstandard production, and furthermore, the audible level does not need to be involved in any nonstandard production of written language. With a language that has a less than clear grapheme to phoneme correspondence, one is reading out loud in one’s head anyway, often thus causing nonstandard spellings reflecting the phonetic realisation of the language. This is done by native users of the language as well as second language users, the results simply differ from one another slightly.

Native language users tend to mix similar sounding phonemes with minor acoustic differences, or produce nonstandard forms of phonemes undergoing a phonological process as in the case of Greek with vowel orthography mostly consisting of vowel raising and the loss of vowel quantity, for example. The second language user typically denotes other types of nonstandard forms, largely resulting from the level of native language phonological transfer in second language production, which in turn, in the case of Egyptian scribes, is often dependent on the level of Greek education of the scribe (e.g. Turner 2016: 58). Layton (2000: 33) claims that nonstandard spellings of phonetic nature in Greek loanwords in Coptic likewise also increased with time and coincided with the first separation in 451 of the Monophysitic (later

Coptic) Church from that of the Pro-Chalcedonian Church,[15] and later with the eventual replacement of Coptic by Arabic (Wipszycka 2010: 343-344). This must mean that the education of Greek was lacking in these times, and the standard spelling rules were not known to the writers, even if they knew Greek enough to produce nonstandard graphemic variants based on pronunciation. If this is true, a phonetic analysis based on the basic principles of second language acquisition and transfer of native language phonemes is all the more needed. Therefore, in what follows I will sketch an outline of which factors affect the written production, especially from the second language user's point of view.

1.4.3 Articulatory phonetics, phonological typology

To be able to determine which features of nonstandard Greek derive from Egyptian influence and which result from the Greek internal phonological development, I have analysed the orthographic variants in relation to their phonemic surroundings. Afroasiatic languages work on a consonant-based word formation principle which creates a reverse effect on the phonological structure of the language to ours: consonants affect vowel qualities, whereas in the phonological study of Indo-European languages it is more common to study the vowels' effect on the consonants. Of course both affect each other in coarticulation, the difference is a matter of preferred perception. The focus in Afroasiatic languages falls on the consonant quality, and having a vowel that has taken over some of the properties of an adjacent consonant means that even before the production of the consonant, there is some information available about its quality (see e.g. Traunmüller 1999 of this process in languages with a heavy emphasis on the consonant quality). This matter will be further discussed in the appropriate chapters and in Dahlgren and Leiwo (in prep.). The phonological analyses in Chapter 4 and 5 will show the importance of consonant-to-vowel coarticulation for the study of the nonstandard Greek variants and the determination of their source.

One of the most important factors of the languages' phonological system in this study is the effect of stress. In phonological typology, two kinds of stress systems are usually differentiated as the major ones in the languages of the world: syllable-timed and stress-timed. Stress-timed languages are e.g. English, Portuguese, German, Russian and Arabic; syllable-timed are for example Italian, Spanish, and Finnish. The division of these systems is of crucial importance: stress-timed languages are prone to reducing syllables and this is often done by reduction of vowel quality in order to maintain a steady rhythmic interval in between syllables; syllable-timed languages, on the other hand, often maintain stress in the same position in the word (Auer 2001: 1391-1393).

In effect this means that stress-timed languages cannot maintain vowel quality in unstressed syllables in its entirety and it is therefore reduced to schwa. Take for instance the word *civilization* from English, a stress-timed language. Its standard pronunciation is /ˌsɪvɪlaɪ'zeɪʃ͡n/ but in rapid speech it is due to the length of the word and the length of the diphthong in the pre-stressed syllable reduced to [ˌsivilə'zeɪʃ͡n] with schwa replacing the diphthong /ai/. In addition to these two systems there is, according to some phonologists, a third stress type, mora-timed, which is found in e.g. Japanese, Maori and Ancient Greek. For Greek, probably the most notable reference is Kiparsky (1973: 796-805), in which Kiparsky gives perhaps the shortest and easiest distintion between syllable-timed and mora-timed languages (both of which carry phonemic vowel length distinctions): that in mora-timed, long vowels (and

[15] A detailed account of the church institutions in Egypt is given in Wipszycka (2010: 331-349); about Greek-Coptic bilingualism within the church, see pp. 341-342.

diphthongs) are treated "not as units, but as sequences of short vowels", explaining that e.g. Greek *tʰḗr* 'beast' is represented as /ee/, not as /e:/.

However, there is a study in which a different approach was used from that normally taken to measure the differences. The duration of vowels, and the duration of intervals between vowels in a passage of speech were measured, instead of measuring interstress intervals or syllable durations as usually; in other words, the measuring rested on phonetic grounds, not phonological, which makes sense as perception of stress is acoustic. It was found out that while stress-timed languages and syllable-timed languages do sound acoustically different from each other, there is a degree of being more or less of either one of them; therefore, there is no clear-cut divide between the languages of the world according to stress systems. Furthermore, there is considerable overlap between the stress-timed and syllable-timed groups, with some languages not belonging to either one of them. In this study, Japanese was the only language classified as mora-timed, and it was predicted to pattern more with the syllable-timed languages than the stress-timed ones; however, it was found to be almost perfectly in the middle of English and French in that vowel duration was closer to French (syllable-timed), whereas intervocalic values related to speaking rate were closer to English (stress-timed). The only certain thing about Japanese was that it was not in a rhythm class of its own. (Grabe & Low 2002: 515-546).

The relevance of the stress system typology for this study is the fact that Egyptian and Greek originally had different systems with Egyptian being a stress-timed language and Greek (as traditionally described) a mora-timed one. Therefore, Coptic had a strong tendency to reduce especially unstressed vowels and had fixed stress patterns. Greek, as mora-timed, would not reduce vowels, which would be true even if Greek had been syllable-timed, given the discussion above. It can probably be taken as a given, however, that Greek was originally not stress-timed because vowel quantity was phonemic. Be that as it may, for the sake of convenience, Greek will be continued to be described as mora-timed in this work, although vowel quantity will be marked according to the standard convention of not two sequential vowels but a lengthened vowel (i.e. /e:/, not /ee/ for <ē>).

Egyptian could only have stress in the last two syllables, in Egyptian studies called the *'Zweisilbengesetz'* i.e. 'Law of the two syllables' (Loprieno 1995: 37) whereas in Greek any of the last three syllables could be stressed; because Greek was originally a mora-timed language, it could hold important morphological distinctions in the unstressed syllables' vowels, most often word-finally, due to not reducing vowel quality. When these word-final vowels were reduced by the Egyptian writers and this was reflected in the level of orthography, important meaning of specific forms were confused.

However, Greek eventually lost vowel quantity and the stress system changed into a stress-timed one, and this was in process during the time period of this study. One of the main questions in this book is this: which language system is followed in those instances where it seems that the Greek original stress had been moved to another syllable? Was it transfer from Egyptian or Greek internal development? I will try to answer this question in the phonological analyses in Chapters 4 and 5.

1.4.4 Second language acquisition (SLA), second language writing system (L2WS) and loanword phonology

I believe the nonstandard variation in the Greek texts in Egypt to some extent derives from the phonological transfer from Egyptian to Greek. Therefore the process of second language acquisition has to be studied in order to understand the basic principles of how and why the native language of a person affects the acquisition of a foreign phonological system, especially

when the language has not been learnt in early childhood, the most likely scenario for most of the Egyptian scribes in the early Roman period. The imperfect learning of the target language (TL) is discussed in Chapter 3.

Although the linguistic level of interest in this study is phonology, the material is still in written form only. In order to understand how information of phoneme qualities can be extracted from the level of orthography, I also explain in Chapter 3 the effect of one's L1 phonological system on using a second language writing system (L2WS), as well as go through the principles of loanword phonology. The deviations from the standard Greek orthography are compared to those of the same nature in Greek loanwords in Coptic, so the issue of the phonological treatment of loanwords is relevant for this study. Furthermore, loanword phonology serves well as a theoretical frameword when studying language contact because ultimately all foreign words encountered in such a situation, especially if the second language is used regularly, will go through some degree of the same phonemic integration system as those loanwords that actually remain in the lexicon of the native language. And when loanwords do become a permanent part of the L1 lexicon, they also become subject to the orthographic rules of the native language writing system (L1WS).

2. Language situation in Narmouthis in the 1st - 3rd centuries CE

Not much is known about Narmouthis, but Bagnall & Rathbone (2004: 127-128; 145-146) give a decent description both of the archaeological findings and the area in general. According to Bagnall and Rathbone, the village of Narmouthis was about 60 hectares in size and situated high at the edge of the desert in Fayyum. It existed already in the pharaonic times but the area, as it was known in the Roman period, was established in the Ptolemaic era. The temple complex displays some features of all the different eras and construction phases with inscriptions related to the year 96 BCE about the commencement of activities by the Ptolemaic temple, as well as some hieroglyphic reliefs on the walls of the pharaonoic temple stating the temple to have been founded by Amenemhat II while the work was finished by his son Amenemhat IV. The old temple was dedicated to the crocodile deity Sobek and more importantly, to the cobra deity Renenutet, the goddess of nourishment and harvest. Renenutet is, according to Gallo, the source for the Greek name *Narmuthis*, deriving from the Demotic *Niw.t-Rnmwtj.t* 'the town of the goddess Renenutet' (with coarticulation and the feminine *-t* ending deletion (often happening coming to Coptic) taken into account, perhaps approximately /nar(n)muti/). Or, it could be a late reinterpretation from a more ancient *Nꜣj-Rnn.t*, 'those of the goddess Renenutet', a name formation based on the plural of the Egyptian possessive article *nꜣ(j/w).* The latter was a more common base for naming the *Na-* beginning Greek toponyms as in Naukratis *Nꜣ(j)-Krṯ* 'those of Krt'. (Gallo 1997: 127). *Nꜣj-Rnn.t*, is, however, more difficult to connect to the phonetic form of the Greek name. Be that as it may, in Egyptian, the name was *Dja.* During the Ptolemaic period, the cult of Renenutet started to merge with that of Isis.

Apparently, Narmouthis was a wealthy area. Not much is known of Fayyum in general before the early 3rd century BCE apart from the fact that 1500 years prior to that there was housing in the area. Fayyum situated by the Nile so it was obviously fertile, which caused the Ptolemaics to further develop the area to increase productivity (Bagnall 1997: 17). The irrigation system had already been under improvement efforts during the pharaonic times in the form of digging a canal through Lahun, which increased the water intake in the area so much that local Egyptians started calling the place 'the Lake' from Egyptian *Pꜣ-jm*, the origin for the name *Fayyum*. The Ptolemies I and II continued improving the situation by building further canals, finally increasing the arable land to triple the size it was before their efforts.

Fayyum, as mentioned, was a fertile area with gardens, vineyards and fruit trees growing everywhere after the Ptolemaics made it into one of the best agricultural areas. The reason behind this endeavour was to offer the land to the Greek soldiers they brought with them in order to provide them with an income during peaceful times. Fayyum suited this because it did not have an existing agricultural setting and the Ptolemaics did not want to take land from the Egyptians to give to the Greeks. Fayyum therefore had a large population of Greek immigrants, estimated to as much as thirty percent of the population (although this figure includes all other non-Egyptian citizens as well). In addition to soldiers, there were other Greeks in the area, for example merchants, as well as Egyptians from other parts of the country hired by the soldiers to take care of their lands. Fayyum seems to have been a melting pot of sorts of cultures and dialects, and according to some opinions, the local Greeks considered themselves as both Greeks and Egyptians. (Bagnall 2000: 17-20). During the Roman period, land was similarly given to soldiers from the Roman army, which added to the mixture of cultures and languages in the area.

During the excavations of the Narmouthis temple area by the Italians, they found two areas of housing. The houses were from the Roman and Byzantine periods and built on the ruins

of the Ptolemaic constructions. Those to the west of the temple *dromos* have been buried in the sand but on the eastern side, eight houses remain. The houses had clearly been large and well equipped with stone paneling in several rooms and a paved floor in one room. An aerial picture taken in 1934 shows that the area had a regular city plan and that there were many houses along the streets. There are visible marks in the area of eight different chuches built between the 4th and 6th centuries; however, there was still religious diversity in the area, as a box of copies from 4th/5th centuries of some Manichaean texts translated from Greek and Syriac to an Upper Egypt Coptic dialect was found in one house's cellar and as late as early 10th century, Coptic and Arabic texts were found in Narmouthis. After that it appears that the town was abandoned. (Bagnall and Rathbone 2004: 127-128, 143 – 146).

During the Roman period, however, Narmouthis seems to have been an influential village, possibly responsible for the economic wellbeing of other minor sanctuaries in the area. Some Demotic Egyptian ostraca found in the same Narmouthis temple in which the Greek texts were found have orders to the staff from their superiors. These instruct the personnel to deliver goods to the smaller sanctuaries in the area, apparently commodities they did not have that existed in the bigger village, Narmouthis. These include e.g. rubber, lamp oil, salt and various sorts of fresh produce such as eggs, bread, and pigeons. (Gallo 1992: 121-123).

Narmouthis was of some substance, then, and although it is difficult to ascertain from the hands in the texts from OGN I how many scribes there were in the temple, it seems likely it was more than a few considering the picture painted here. If Narmouthis temple really was the biggest and most influential in the area at the time, it could even have had the ability to affect the linguistic habits of other scribes with whom it had correspondence in the area. This issue is taken up again in Chapter 5.

2.1 Greek internal phonological development

By the time of the Narmouthis ostraca, the Greek phonological system had undergone some major developments. Vowel quantity was lost, which is evident in the constant interchange of *omicron* and *omega*, those two having merged to the single vowel /o/. The confusion of *eta* and *epsilon*, on the other hand, existed but was far rarer; they had developed not into one single phoneme along with the losing of quantity but two: *eta* started raising toward /i/, varying frequently with /ei/ that had almost completed the process of raising, and epsilon stayed as /e/. *Iotacism* also concerned the raising of /oi/ and /y/ to /i/ but this was still in process, although the first two seems to have merged and were at the time of OGN I both phonemically /y/. Horrocks (2010: 167-170) describes the major developments, agreeing with Teodorsson (1977) on the dating of the sound changes. Below is the graphic representation of the phonemic situation from mid-2nd century BCE as presented by Horrocks (2010: 167).

Phoneme	Spelling
/i/	ι, ει/–C or #, ηι(ῃ)
/y/	υ
/ę/	ει/–V, η
/ø/	οι
/e/	ε, αι
/a/	α, αι (α/)
/o/	ο, ω, ωι(ῳ)
/u/	ου

'Diphthongs'	Spelling
/yi/	υι
/iw/	ηυ
/ew/	ευ
/aw/	αυ

Table 2. Greek phonemes in Egypt, mid-2nd century BCE (Horrocks 2010).

OGN I material is several centuries later but seems to verify most of the phoneme qualities presented by Horrocks. /ai/ and /e/ seem to have already merged ages ago as there is no ambiguity whatsoever regarding them, unlike still some existing between the /i, e/ grapheme representatives ει, η <ei, ē>. Regarding the latter, the matter is unclear and is the most difficult of all the nonstandard variation to analyse because of the strong simultaneous probability of Greek internal development affecting the situation on the one hand, and Egyptian structural transfer on the other (more on this in Section 4.3.3). Quite possibly both are at work at the same time, adding to the generally multicausal situation familiar from many language contact situations.

Joseph (1982: 1-3) has remarked on how linguists who are trying to explain change in language(s) with some form of language contact are often countered by others who try to explain the same changes by some language-internal development. Joseph gives an example of the Indo-Aryan languages developing a contrast between dental and retroflex consonants, which has by some scholars been explained by contact with Dravidian or Munda, which had this opposition, and by some others that regular phonetic developments in early Indo-Aryan caused, or at least enabled it. Likewise, regarding the Balkan Sprachbund, as clear an example as it is of such a case, some pan-Balkan linguistic features such as the absence of infinitival verb forms and the use of finite forms instead of these, have equally been explained both in relation to language contact as well as language-internal reasons. Joseph concludes that more than probably, the truth lies in between these two different views, that some language-internal feature must have contributed to the fact that such a change was possible in a given contact situation, or that in the case of the Sprachbund, it is not likely that all these languages would have independently gained this particular linguistic feature common to all them without the geographical closeness and therefore the possibility for language contact. Furthermore, Joseph emphasises that many or even most linguistic changes have multiple causes behind them, and that language contact situations are also unique with varying outcomes even under similar circumstances.

The aspect of multicausality is a very significant feature in the outcome of Greek spoken in Egypt, and in many cases difficult to explain in a satisfactory way even though it is quite obviously the most logical explanation available. For instance, Gignac (1976; 1991) has commented on *iotacism* to have been more advanced in Egypt than elsewhere in the Greek speaking world due to the effect of Coptic transfer, Coptic having had fewer front vowels than Greek and therefore having caused confusion on Egyptian writers regarding the qualities of

these due to underdifferentiation of them. While this is probably true, and language contact did have an effect on the matter, the situation never would have reached the proportions it now did had Greek front vowels not been in the process of raising in the first place, thus making clear dictintions between them even more difficult than would otherwise have been for a second language user.

Similarly, the Northern dialects in Modern Greek (Thessalian, for example, and the northern mainland in general, and Lefkada, northern Evia, Thassos, Lesbos etc.) raise /o/ and /e/ to /u/ and /i/, respectively, but also delete unstressed word-final /i/ and /u/; the Tsakonian dialect, not descended from the Ancient Greek *koine*, still has the phonetic value /u/ for *ypsilon* along with some other dialects such as Aegina, Megara, Mani and Old Athenian (Horrocks 2010: 404; Trudgill 2003: 53-54; 59). These are therefore possible developments Greek internally. However, even though a feature can develop within a language's structure and has done so in some dialects, it does not mean that it could not enter a language also through language contact – there are only so many phonological options in the languages of the world that they are bound to exist in many languages simultaneously, and furthermore, none of the features found in Greek in Egypt exist simultaneously in any one of the modern Greek dialects.

There is one more difficult feature under the cloak of multicausality: the loss of vowel quantity affected the Greek stress system, changing it gradually from mora-timed to stress-timed, again a feature that was probably in Egypt accelerated by the impact of Egyptian (Horrocks 2010: 169-170). Egyptian was stress-timed with a strong syllable peak that caused reduction to unstressed syllables, and this is one of the highly noticeable features in Greek nonstandard writings coming from Egypt. The variation regarding this will be discussed in Chapters 4 and 5.

2.1.1 Greek settlers and the local Greek dialect

There is very little knowledge of what particular Greek immigrant groups moved to Fayyum during the Ptolemaic period – presumably, if they were army veterans, they would have come from various regions in Greece, and similarly the Roman army had population from everywhere in the Empire in the Roman period.[16] The salt-tax lists provide some information on the ethnic population in the Arsinoite nome during the Ptolemaic era (3rd c. BCE). There appears to have been Egyptians from various reagions from Aleksandria to Memphis, Syrians, and Greeks from many parts in Greece – a comprehensive account is provided by Clarysse & Thompson (2006).

It is therefore difficult to say what particularly would have been the so-called local dialect of Greek in Fayyum, if indeed there was one – it is possible that a local variety could have developed from the various dialects in the area, levelling the major differences in them, but Clarysse, based on Horrocks (1997: 32-42), states that in the Eastern territories of Greek usage, the old dialects played no role and everyone seems to have spoken the same language, i.e. Koine, based on colloquial Attic with "a certain" input of the other dialects, mainly Ionian. Indeed, Clarysse claims that after the 260's BCE, nothing seems to be left of the languages spoken in the older period, when individual dialects were still used as in *UPZ I* 1, a papyrus depicting the curse of Artemisia, from 399-300 BCE. There were areas in which dialectal Greek was used in e.g. names, such as the Doric features in the apparently Cyrenean community

[16] Clarysse (1998: 5) mentions that the various ethnic groups tended to stick together in the Egyptian *metropoleis* as they do nowadays in the modern ones of the world. Arsinoite seems to have been largely inhabited by Greeks from e.g. Macedonia. However, linguistically this probably bares no relevance to the subject at hand because by the Roman period, Koine had taken over the dialects. To those interested, *Wörterbuch*$_1$ & *Wörterbuch*$_2$ (III Band & Suppl. 1) list *Ortsbewohner* and *Völker*, mentioning such Greek cities as e.g. Athens, Aigeia, Delphi, Thebes, Rhodes, Troy etc. (Preisigke 263-274; Kiessling 1971: 400-402).

present in a bilingual text (of tax payers) from Jena; even this text, however, is dated to 230 BCE (Clarysse 1998: 1-5). However, there certainly were Egyptians in the area, so it does not seem unreasonable to assume that after generations of Greek speakers in the area, some transfer features from Egyptian might have got across even to native Greek speakers, or that the bilingual Egyptians probably had an Egyptian accent in Greek. Clarysse (1993) gives a detailed account on some of the Egyptian scribes who wrote in Greek, including some idiosyncracies of the Egyptian scribes' Greek writing including e.g. the frequent confusion of *eta* and *epsilon* Clarysse considers to be of Egyptian influence, the non-declined forms of Egyptian names, and morphosyntactic transfer from Egyptian (Clarysse 1993: 195-200; see Section 4.1 for the Greek declination of Egyptian names).

Unfortunately there is no reliable data as to how the Macedonian dialect from the period of Alexander the Great was pronounced but it is probably of little relevance as the court spoke Attic, and the royal court of Alexander maintained an apparently conservative variety of Attic and tried to contribute to the maintanence of this also outside of court. This, according to Horrocks, might have delayed the progress of spoken Koine in Egypt compared to other regions in the Hellenistic east which were slowly catching up on the development patterns seen in the majority variety of Athenian Attic already in the 2nd century BCE but pushed back in Koine because it was based on a conservative version of Attic. (Horrocks 2010: 165-167).

2.2 Egyptian varieties and the local Egyptian dialect

Egyptian has traditionally been divided to five different stages, with some differences in dating among Egyptologists: Old Egyptian (3000-2100 BCE), Middle Egyptian (2100-1300 BCE) and Late Egyptian (1300-650 BCE); these three stages used hieroglyphs for writing, and especially Late Egyptian used the so-called hieratic script, a cursive script for handwriting. Demotic Egyptian (650 BCE-5th/4th ct. CE) is written with an even more cursive and abbreviated script developed from the hieratic script (Allen 2010: 1; 5-7). After this comes Coptic (ca. 4th-ca. 14th ct. CE), the last stage of the language, which was written with the Greek alphabet with six/seven (depending on the dialect) additional letters from Demotic (a detailed account of the Egyptian varieties, including Coptic dialectal variation and description of all the writing systems, in Grossman & Richter 2015: 69-101).

During the time period of these texts, 2nd to 3rd centuries CE, the native Egyptian language was at a stage now called Demotic Egyptian, a consonantal writing system, but the Coptic language form was on its way. It has been argued that Coptic was mostly used for private usage and outside of that there were mainly literary texts; there were very few Coptic texts in general before the 4th, and practically no (administrative) documents before the 6th century. Then again, there is literary evidence for Christianity as early as 2nd to 3rd centuries from Fayyum, earliest outside Alexandria, and a 3rd century magical text from Soknopaiou Nesos (Choat: 2006: 30-42; more specifically p. 38; a description of the societal relevance of Coptic in Richter 2009: 402-406, and about and dating of Coptic documentary writing in detail in Richter 2008 (2), especially *Vorwort*).

Demotic Egyptian was written in a complex script derived from the hieroglyphs and, because of its complicated nature, was mainly only used by trained scribes in the temple environment, and by the second century CE, mainly for temple purposes and tax receipts (Bagnall 1993: 230-60; Fewster 2002: 225). Demotic was fairly conservative compared to Coptic; Demotic had some Greek loanwords but generally revealed the language contact with Greek in the written language less than Coptic, which allowed a high number of Greek loanwords to infiltrate the language (see Clarysse 1987 for Greek loanwords in Demotic, 96 in total; technical terms, proper names, honorific and official titles etc. – the basic items of

loanword borrowing. Richter (2009: 407-408) considers also the less than typical lexical borrowings from the Narmouthis Demotic ostraca (ODN), school exercises and private notes, because the Greek words were written in Greek letters in the middle of the Demotic cursive, and a couple of Late Demotic medical and magical manusripts containing Greek names for many ingredients). Coptic was also different from Demotic in its wide use of prefixes, a feature the earlier stages of the language (Old to Middle Egyptian) did not have, but which had, in fact, according to some studies, already slowly been developing in Demotic (Loprieno 1995: 7).

It has been argued that the Narmouthis Demotic ostraca (ODN), although written in the Demotic Egyptian script, reflect the linguistic changes already existent in the spoken language that are, indeed, finally seen in written form in Coptic. For example, there were some Greek words in the Narmouthis Demotic texts and, for example, a number of occasions where the Demotic auxiliary verb *ir* 'make' is used together with a Greek infinitive; this is a (later) Coptic practice, used to introduce originally Greek verbs with the preceding Coptic auxiliary ⲉⲣ *er* 'make', the vowel in Coptic having changed to /e/ (Ray 1994: 61; Rutherford 2010: 199; 204; 206; Grossman & Richter 2017: 207-209; see also Section 5.1.2 for more on the Greek verb treatment).[17] The same linguistic signs related to Coptic have also been found by Pernigotti, who lists such features in the Egyptian of Narmouthis Demotic ostraca, such as the frequent confusion between <r> and <l>, a phenomenon connected to Fayyumic Coptic (this particular feature regarding the /r, l/ confusion in Fayyum was already mentioned in relation to Demotic texts by Spiegelberg (1925: 8 (§4, 13)), and feminine nouns ending in -*i* as is customary in Fayyumic Coptic (Pernigotti 1984: 788-791). Quaegebeur (1991: 190-191) has (tentatively, although on grounds of writing attempts only) classified Narmouthis's Egyptian as Pre-Old Coptic i.e. belonging to the stage before Old Coptic, among the first attempts to write Egyptian with Greek characters, although at this stage not utilising Demotic Egyptian signs to transliterate phonemes that did not exist in Greek as later became the practice for Coptic proper. Quaegebeur also posits the Narmouthis texts to the 2nd century CE.

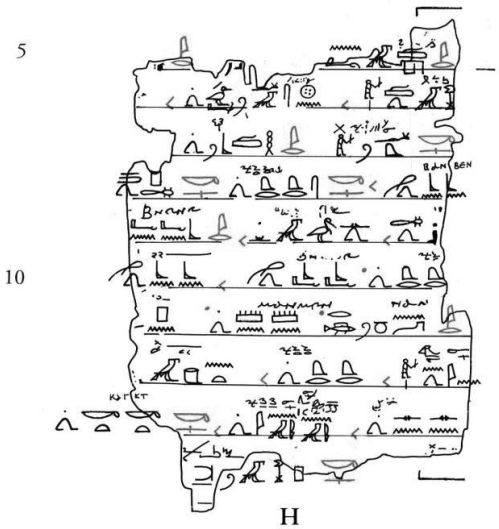
According to Layton, Coptic came into existence "from about 200" CE (Layton 2000: 1; see, however Choat's and Richter's dating of Coptic writing above, and below); the Narmouthis collection's texts are from the second, some from the beginning of the third, century CE (Pintaudi & Sijpesteijn 1993: 11 – 12). As can be seen from above, Coptic proper was not yet used (on the written language level) in the time period of the Narmouthis ostraca, but the earliest attempts to try to write the Egyptian language with the Greek alphabet are in fact much earlier than the second century. The first attempts of writing Egyptian with the Greek alphabet started already in the early 6th century BCE in Abydos in the form of some Egyptian names inscribed by Greek soldiers at the temple of Abu Simbel (Richter 2009: 410).

More followed until the so-called Old Coptic manuscripts, from the first three centuries CE. These, according to Richter, already show some form of standardisation in transcription practices, and introduce Egyptian signs to depict phonemes not part of the Greek phonological system (and therefore not accounted for in the alphabet). The grammar in these texts, according to Richter, is however still Egyptian, without all the Greek loanwords. The texts come from a pagan setting and include a horoscope and a magical spell, as also mentioned by Choat (2006). In addition, there is a hieratic onomasticon (*P.Carlsberg* 180, with some additional fragments in *P.Berlin* 10465 and Florence (*PSI I* 76)) from ca. 180 CE that has glosses in both Demotic

[17] The matter is, of course, a bit more complicated than this, as Coptic dialects used differing strategies for Greek verb integration in Coptic. Bohairic and e.g. Fayyumic, for instance, used the *er-* + Greek infinitive structure (the light verb structure), in which the Greek verb behaves like an undetermined noun. Sahidic and e.g. Middle Egyptian (i.e. Mesokemic), on the other hand, do not use auxiliary verbs, i.e. no light verb occurs, but the Greek verb occurs in environments in which Egyptian infinitive verbs occur (direct insertion strategy). In this formation, the Greek verb derives either from the infinitive or the imperative. Also other strategies exist within the Coptic dialects, with the light verb in e.g. Lycopolitan being written with a singular *r-*, and in the Fayyumic varieties also as *el-*. (Grossman & Richter 2017: 207-209).

and Old Coptic on it, denoting unusual words in this way in order to make sure they would be understood in full (see Osing 1998: 52-60 for the Old Coptic glosses in relation to the hieroglyphs and the alphabet, with a phonemic description, containing several Demotic signs). The earliest Coptic proper texts, so categorised among other things by whether they included Greek loanwords or not, began appearing after this, among them *P.Bodmer VI*, The Old Testament Book of Proverbs. It uses many Demotic signs, as many as ten letters instead of the six or seven usually taken in Coptic dialects (the alphabet and linguistic description can be seen in Kasser 1960: XVIII-XXVIII). This is reminiscent of the Old Coptic system but the grammar is Coptic, and the text includes as many Greek loanwords as any other Coptic text. (Richter 2009: 412-414). See picture (2) below from *P.Carlsberg* 180, with a facsimile (3), in which some Coptic characters can be seen.

(2) Picture from the *P.Carlsberg* papyrus (Osing 1998).



(3) Facsimile from the *P.Carlsberg* papyrus (Osing 1998).

To conclude: even though there was not much of even Old Coptic writing at the time of the OGN I texts, the evidence shown above is sufficient for arguing that the Egyptian language form used by the Narmouthis scribes had features close to Coptic; according to Grossman & Richter (2017: 215 fn9), the Demotic of the Narmouthis ostraca is linguistically much closer to early Coptic varieties from the general area, and could even be considered a Coptic variety written in Demotic script, from the linguistic point of view if nothing else. It seems likely that the scribes could have been able to write Old Coptic. It is also likely that the phonological system was already at the time of the Narmouthis ostraca very much similar to what was later reflected in Coptic orthography ca. 300 CE onward.[18] Therefore, even though the Egyptian language form used in the bilingual and Egyptian documents of the Narmouthis collection is Demotic, Coptic is used as the relevant comparison between Greek and Egyptian because of its ability to show Egyptian vowels, and because its nonstandard usage of vowels in Greek loanwords is highly reminiscent of the nonstandard production of the vowels in Greek texts produced by Egyptian scribes.

[18] I thank Sebastian Richter for this clarifying comment.

The Coptic dialect spoken in Narmouthis was Fayyumic, although Eitan Grossman has analysed the dialectal variation and suggests that there might have been an independent variety in Narmouthis on linguistic grounds as discussed above (Grossman & Richter 2017: 231). The earliest Christian texts mentioned above include a private copy further introduced in Section 5.1 with very similar variation to the Narmouthis Greek ostraca. Interestingly enough, there is no variation between /r/ and /l/ in either one, this typical feature of Fayyumic Coptic encountered in many texts, also including ODN, taken quite often as one of the only possible signs on which to assign the text in that dialectal frame. However, there are other features that seem to derive from the practices of Fayyumic in OGN I. The discussion about these and a brief description of the Fayyumic dialects continues in Chapters 4 and 5.

2.3 Coptic phonology

Egyptian had a long history and by convention, it has been divided into different stages following the changes in the writing system. There was a divide between the so-called Demotic Egyptian and the following form, Coptic, during the period studied in this book; partly they seem to have overlapped. Demotic Egyptian was a consonantal writing system and is therefore almost useless for comparing Egyptian and Greek vowel values; Coptic Egyptian, on the other hand, used the Greek alphabet with the vowel graphemes it provided and is for that reason used as a comparison for the Greek study.

I use the term *Egyptian* when I speak of language structures that were probably in effect even in pre-Coptic Egyptian, and *Coptic* when examples are taken directly from Coptic. Sometimes the distinction is not easy to make so here are some basic guidelines regarding the use of the terminology. For vowel phonology of Egyptian, I use the term *Coptic* because especially for vowel quality, there is no definite knowledge of Egyptian phonemes before the Coptic stage of the language. For the prosodic system, I use the term *Egyptian* because it can be assumed to have been in use in similar form even in Pre-Coptic Egyptian.

To start with a comparison of the phonological systems of Egyptian and Greek, some structural knowledge of Egyptian is needed (for a comprehensive typological description of Egyptian see Haspelmath (2015: 130-143)). Egyptian and Greek were structurally very different languages. Egyptian, as an Afroasiatic language, had a word formation principle based on root and pattern morphology, i.e. on a consonant root, on which the abstract meaning of the word lay. Vowels in this system are used to form grammatical categories. Consonants, therefore, had a higher functional load[19] than vowels in Egyptian, and higher than in Greek, which relied on vowel quality to mark e.g. gender and number in case endings, and modality in verb formation. It is therefore understandable that there would have been a high degree of concentration on the perception of consonant quality. This is demonstrated by e.g. Arabic, another member of the Afroasiatic language family, which has a phonological rule regarding vowel fronting or retraction according to the quality of the adjacent consonant, in Arabic philology called *imāla* (this matter is further discussed in Section 5.2). It is the same phenomenon in Coptic albeit there was no standard phonological rule for it; consonants affected vowel quality, evident in e.g. the renderings of Greek loanwords.

Higher functional load for consonants than for vowels has also been evidenced in e.g. North-West Caucasian languages and in Northern Chinese studied by Traunmüller, all

[19] *Functional load* means the relative frequency of occurrence of words that are differentiated in one and the same position by only one distinctive feature. In English, the opposition of voiced and voiceless *th* has a low functional load being used only to distinguish such pairs as ether and either, or *wreath* and *wreathe*. Random House Dictionary, © Random House, Inc. 2015.

languages that have a wide range of consonants, including pharyngeals similarly as Arabic and Coptic have pharyngealised consonants. In the NW-Caucasian languages, there is only one phonological opposition among their vowels, /ɑ/ vs. /ə/, and Northern Chinese has a similar system with three different distinctive degrees of openness and a more backward neutral setting than the NW-Caucasian languages. The coarticulatory effects on vowels in these languages are immense with vowel quality following that of the adjacent consonant almost perfectly. Traunmüller reports that listeners of these languages could "exploit the fact that vowels contain reliable information about the consonants", which is clearly the rationale behind the system (Traunmüller 1999: 141-143). The consonant-vowel ratio (see explanation below) of languages such as these is very high meaning that by necessity, every consonant is functionally loaded for information as the two vowel qualities can only serve a limited function in distinguishing word meanings. The adaptation of the schwa into the quality of the consonants is an obvious result of rapid movement from one articulatory place and manner to another one, in which there is not enough time to preserve the quality of the vowel. Nevertheless, this feature of the languages also aids in recognising the subtle differences of consonant quality in rapid speech, giving immediate acoustic cues of the quality of the next consonant in the form of the adapted quality of the schwa.

The consonant-vowel ratio of Coptic, according to the World Atlas of Language Structures Online, is 'average' on its ratio of 22 consonants to 7 vowels (Maddieson 2013). In historical Egyptian, before the Coptic stage of the language, however, the consonant-vowel ratio was 'high' at 26:3, bearing in mind, of course, that the consonantal writing system prevents knowledge of more vowel qualities than the estimated triad *a-i-u*, realised as vocal or consonantal, depending on the phonemic environment (see e.g. Allen 2010: 13-17). However, while a highish consonant-vowel ratio can alone be the reason behind the importance of consonant quality in Coptic, I believe there is an even more pressing reason for it in the language's tendency to code morphological meaning onto the consonant root of the words. This makes it very different structurally from Greek, and might go a long way toward explaining why especially the first generation Egyptian scribes did not hold it in great importance to keep the Greek vowel qualities intact in writing; they might even have had difficulties in perceiving them clearly as concentration must have been focused on the consonant quality (see the English text messages by an Egyptian Arab in Introduction for reference). The matter would not have been helped by the fact that before Coptic, there was no habit of writing vowels in the scribes' native language.

Finally, this linguistic system so different from the Indo-European languages explains why the nonstandard vowel variation in Greek written by Egyptian scribes revolves around different allophonic representatives of schwa (Chapters 4 and 5 will give more information on this): when all the unstressed syllables get reduced, schwa is the most useful vowel quality in between consonants to give information on their quality. The system was not useful for Greek, of course, and it was even harmful in reducing the quality of word-final vowels which in Greek carried morphological information, but it was probably so deeply engraved into the native language system of the Egyptian writers that it often got transferred inadvertently.

2.3.1 Coptic phoneme inventory and stress system

Coptic borrowed the Greek alphabet with all its symbols and added some 6-7 extra ones from the Demotic Egyptian writing system for consonants that did not exist in Greek: as mentioned in the previous section, Coptic did still have an impressive consonant inventory, even if it was not at the same level as in Middle Egyptian. Otherwise the Greek phonemic values were more

or less kept, including the two graphemes each for the original long and short /e/ and /o/. Below is the Coptic consonant inventory as presented in Loprieno (1995: 40).

CONSONANTS	LABIAL	DENTAL	PALATAL	VELAR	GLOTTAL
PLOSIVE					
Palatalized				ϭ /ḳ/	
Voiceless[52]	ⲡ /p/ [pʰ]	ⲧ /t/ [tʰ]	ϫ /c/ [cʰ]	ⲕ /k/ [kʰ]	<[53]> /ʔ/
Ejective		ⲧ /d/ [t']	ϫ /ǰ/ [c']	ⲕ /g/ [k']	
[Voiced]	ⲃ /b/ [β]	ⲇ /d/ [d]		ⲅ /g/ [g]	
FRICATIVE					
Voiceless	ⲫ /f/	ⲥ /s/	ϣ /š/	<[54]> /x/	ϩ /h/
[Voiced]		ⲍ /z/			<[55]> /ʕ/
NASAL	ⲙ /m/	ⲛ /n/			
VIBRANT		ⲣ /r/[56]			
LATERAL		ⲗ /l/			
GLIDE	(ⲟ)ⲩ /w/		(ⲉ)ⲓ /j/		

Table 3. Consonant inventory of Coptic according to Loprieno (1995).

In endnotes Loprieno (1995: 247-248) explains etymological processes of the glottal stop (note 53), voiceless velar fricative (note 54) and voiceless glottal fricative; all of these have had an effect on the Coptic vowel system. The glottal stop /ʔ/ is rendered in most dialects as null in initial and final position, except in Fayyumic and Bohairic, where it takes the value /i/ at the end of monosyllabic words (in some other dialects, this could be /e/). It is believed to have been pronounced as a glottal stop by many Coptologists, however, when the vocalic grapheme is reduplicated immediately after a stressed vowel. Therefore <oo> would be considered [oʔo] phonetically, something that Peust (1999) disagrees with, as explained below. The voiceless velar fricative /χ/, the sound heard in e.g. Scottish English *loch*, has independent graphemes in Akhmimic and Bohairic but not in Sahidic, where it has nevertheless left traces of some vocalic oppositions in e.g. ⲥⲉϩⲧ <seht> 'leprocy' and ⲥⲁϩⲧ <saht> 'weaver', due to the latter originally having had /χ/ where is now /h/. The existence of the voiced glottal fricative /ʕ/ in Coptic is, according to Loprieno doubtful; historically, it merged with /ʔ/. It has nevertheless left some traces again in the (final) vocalic oppositions, in for example ϩⲕⲁ <hka> 'wool' and ϩⲕⲟ <hko> 'to be hungry'.

To get to more vital matters regarding this study, however, I shall move into vowel phonology. As mentioned, Greek had lost vowel quantity by the period in which Coptic writing started with the Greek alphabet, so one of the most important questions in Coptic phonology is this: were the phonemic distinctions between ⲉ <e>/ⲏ <ē> and ο <o>/ⲱ <ō> based on vowel quality or vowel quantity?

Coptologists debate over this with the majority choosing to believe the difference was that of quantity. Peust, along with e.g. Greenberg (1962), believes it is quality, and presents some very compelling arguments for it. Peust presents the vowel inventory of Coptic as below (Peust 1999: 201):

low			ⲁ [a]		
		ⲉ [ɛ]		ⲟ [ɔ]	
	ⲏ [e]				ⲱ [o]
high	(ⲉ)ⲓ [i]				ⲟⲩ [u]
	front				back

Table 4. Coptic vowel inventory as presented by Peust (1999).

According to Peust (1999: 201-205) one of the arguments for the quality hypothesis is that Coptic short vowel graphemes have often been used in succession to apparently denote a long vowel, unlike the general belief that this indicates a glottal stop in between the vowels. However, there is also evidence from Greek and Arabic transcriptions of Coptic words that seem to verify Peust's stance, at least for a later period of Coptic - the use of two vowel graphemes for depicting Arabic long vowel quantity can be seen in nonstandard productions of Arabic loanwords in Coptic in Section 5.2.

Furthermore, ⲏ <ē> has been used to indicate schwa in an unstressed syllable before sonorants in Fayyumic, which is probably indicative of coarticulation again as sonorants tend to raise the vowel value – so before sonorants, the value of schwa resembled more a close vowel than an open one. There is also other dialectal variation between ⲉ <e>/ⲏ <ē> and ο <o>/ω <ō> which supports the quality thesis. One of the more convincing arguments, however, is the fact that Coptic *eta* is in Late Coptic pronounced both as [a] and as [i] whereas *epsilon* is only pronounced [ɛ] or [a], seemingly therefore depicting different qualities for the phonemes, explanation and examples of which will follow in Section 4.3.4. Also, in Greek renderings of Coptic words, Coptic ω <ō> often corresponds to υ <y> or ου <ou> i.e. to a vowel more close in value, and similarly Coptic ο <o> is more frequently transcribed in Greek as ω <ō> than as ο <o>. Following the undeniable logic behind these arguments, the quality hypothesis is followed in this book.

A further important point in relation to the study of nonstandard Greek orthography is the manifestation of Coptic allophones in Greek words. Coptic had a strong stress peak which reduced the vowel quality in the unstressed syllable ((Peust 1999: 270; Horrocks 2010: 169-170 - a more detailed discussion follows in Section 4.3.1). The vowel inventory of the unstressed syllable was limited to /a, e, i, u/ and there was no unstressed /o/. This rule is realised, for example, in the following way. Coptic has a stress-related phoneme distribution of /o/ and /u/. /o/ can only occur in a stressed syllable, and in the unstressed syllable, it is often realised as /u/ (further details of this will be given in Section 4.3.1); they are therefore realisations of /o/ in different positions, although /u/ is still an independent vowel quality on its own, not merely an allophone of /o/. Generally speaking, the quality of Pre-Coptic unstressed vowels was often determined by the quality of the adjacent consonants no longer visible in the Coptic form (Peust 1999: 250-254; Depuydt 1993: 355). Coarticulation has therefore been a feature of Egyptian before Coptic and in my opinion, judging by the renderings of Greek loanwords, is still so in Coptic. There seems to be generally a tendency in Coptic to work corresponding to the laws of phonetics: it could be that there could not be an unstressed /o/ in Coptic because when the auditory signal is weaker, i.e. the syllable is unstressed, /u/ is easier to perceive than /o/, which as an unstressed mid-vowel is in danger of neutralising to schwa.

The determination of the Coptic stress position in a word is one of the major concerns in this work. It is frequently said that it occurs in one of the last two syllables (see Chapter 4 for details) but with disyllabic words this can, and frequently is, either one. To be able to study whether there was transfer of Coptic stress on Greek words that had a nonstandard spelling, more accuracy regarding the Coptic stress system is needed. Stress is tied to syllabification and the study of that can give clues to more accurate rules. This is shortly explained in what follows.

Coptic Detail: Paleo-Coptic syllabification rules

Peust (1999: 176-183) has reconstructed the paleo-Coptic syllabification rules to better match linguistic universals. Traditionally it has been thought that Egyptian/Coptic had a syllable structure based on closed syllables, for instance the stressed syllable is assumed to be 'closed' in Coptic if an odd number of consonants follow the vowel, and 'open' if an even number of consonants come after the vowel;[20] all the same, always ending in a consonant. According to this theory, the posttonic syllable contained two consonants, and the syllable must be closed. Stressed syllable could end in a consonant (only one) or in a vowel. The posttonic syllable must also begin with a consonant. However, as Peust points out, typologically it is far rarer to have words ending in a consonant than in a vowel. It is of course possible that Egyptian was one of the exceptions among the world's languages with a consonant-ending syllable structure, like some Australian languages – Egyptian had other rare features in its phonology, such as the presence of ejectives (Peust 1999: 176-177; 181-182; Loprieno 1995: 40-43 for ejectives – discussed again in Section 4.3.1). Furthermore, the system of words ending in a consonant is also common in Germanic languages.

Many words ended in a consonant already in Proto-Germanic, e.g. *hūsan, *sundī, *brōþēr (see e.g. Kroonen (2013) Introduction and dictionary for examples). In German this is frequent, in English partly a result of a sound change. Modern German has many, if not most, words that end in a consonant such as *Haus* and e.g. many verb forms ending in -*n* etc.; in fact, most of the words that end in an open syllable seem to contain a diphthong, such as in *Frau, Bäckerei* (Seppo Kittilä, p.c.). This is relevant because generally in world's languages, diphthongs are considered heavy syllables in the same way as closed syllables i.e. syllables that end in a consonant, and stress-timed languages often have stress in the heavy syllable (see Section 5.1.6 for this in relation to stress positioning in some Greek loanwords in Coptic).

Also many English words end in a consonant (*sin*, *mother*, etc.). Some words that end in a consonant, however, are a result from a phonological process, i.e. loss of a word-final vowel; the so-called 'silent' /e/ at the end of many English words like in (the French loan) *surprise,* and *vote* is probably a result of a shift in stress patterns: a strong word stress makes sustaining the vowel in the posttonic syllable difficult, and English has changed from syllable-timed to stress-timed. This change began in Middle English (from the Old English PIE-based mora-timed stress system) under the influence of Romance words with their syllable-stress patterns, resulting by way of stress realignement compromises by the native speakers to the stress-timed system of Modern English (Markus 1994: 187-189). Consider for comparison the standard French word *apprendre* with the same -*e* ending: English with its (mostly) trochaic rhythm loses the wordfinal unstressed vowel, whereas French (a syllable-timed language) with its iambic rhythm retains is albeit due to its articulatory weakness, produces it as a schwa (word-final /e/ in words like *apprendre* is in speech mostly realised as [ə]; for definition of the stress systems see e.g. Paradis 2001: 22-23 and 33-35 related to the study of English-French bilingual children's realisation of the rhythms language-specifically). Therefore the situation in e.g. English has changed from the

[20] Like this: (1) One consonant following the stressed vowel: ˈCVC. (2) Two consonants following the stressed vowel: ˈCV:|CVC. (3) Three consonants following the stressed vowel: ˈCVC|CVC. In the second example, the stressed syllable is open, in the other two closed (Peust 1999: 176-177).

original preference with the changing of the syllable-timed language to a stress-timed one.

Likewise, it is also possible for languages with a high preference for words to end in an open syllable to use elision in connected speech. Such languages are e.g. Finnish and Japanese, both of which strongly prefer a vowel especially word-finally, so much so that consonant-ending foreign and loanwords are adapted to L1 structure with a vowel (in Finnish usually /i/, in Japanese mostly /u/). Examples of elision in Finnish (4, 5) and Japanese (6, 7) are below.

(4) Standard Finnish	**(5) Elision in connected speech**
Vaikka sinä sanoit että sinä söit.	*Vaik sä sanoit et sä söit.*
'Although you said that you ate'.	

As can be seen, in standard Finnish (4) all other words apart from the inflected verbs end in a vowel, yet in connected speech (5) the vowel can be deleted in almost every one of them; only the personal pronoun *sinä* is abbreviated using a different method but even it can be abbreviated to end in a consonant in some dialects. Even Japanese, which however does not use closed syllables even in connected speech, uses elision to some extent, as can be seen from (6) and (7).[21]

(6) Standard Japanese (Nobufumi Inaba, p.c.)	**(7) Elision in connected speech**
Bento o tabemasu.	*Bento tabemasu.*
'I eat the snacks.'	

The tendency, then, goes both ways – while most languages in the world might prefer open syllables to end words, there is an equal tendency for vowel elision in the same position in connected speech, sometimes, as in the case of English stress pattern changes, leading to sound change resulting in more closed syllables word-finally, at least on the phonetic level (standard orthography often lagging behind).

Something along these lines must be what happened to Coptic, which has many words ending in a consonant. Peust (p.c.), has, in fact, compared the Coptic stress system to that in Germanic languages which varies freely, largely based on syllable structures and word length. It is therefore possible that even though Peust has committed a plausible reconstruction of the Palaeo-Coptic syllabification rules, the syllable structures were similar to the Germanic ones in the Roman period and often ended in a consonant in connected speech; there had been consonant losses from earlier Egyptian to Coptic leaving many words ending in a vowel (Peust 1999: 141-153), and if these were deleted in speech, a consonant ending was again the result. Loprieno (1995: 49-50) follows the traditional theory and claims that although unwritten, Coptic word-final open syllables actually carried remnants of the former consonants /t, r, j, w/ in the form of a glottal stop, derived from the lenition of these phonemes; sometimes, in his opinion, the doubly-closed syllable was in fact marked with <e> or <i>. This is not a crazy idea, thinking again of English: many of its dialects have word-final glottalisation deriving from consonant lenition.

[21] See also Arai's (1999) study on spontaneous Japanese speech, which showed elision in words such as /to omotte/, realised as [tomot:ʔte]; also in this instance, two consecutive /o/'s merged and became one vowel, the resulting /o/ not necessarily adding up to the length of two morae even though it sounds like two /o/'s perceptually (Arai 1999: 616).

There is one important factor to consider: according to both Loprieno and Peust, the syllable patterns of Coptic are similar to those of Late Egyptian when the consonants were still (at least) written word-finally; therefore stress patterns had probably not alternated from that earlier period, and the native speaker still placed stress in the syllable that was originally followed by two consonants, whether they had by the time of Coptic disappeared completely, had weakened to glottal stops, or been deleted in connected speech. Therefore, the rule originally created for Paleo-Coptic, according to which a posttonic syllable always began and ended with a consonant, might still be valid for this study albeit concerning Coptic proper, not Paleo-Coptic. This is reconsidered in Section 5.1.6 regarding Coptic stress related to syllable weight patterns. This does, in fact, fit in nicely with most Greek words in which there seems to be stress transfer from Egyptian to Greek: e.g. *kerason* as *kerasen*, dealt with in more detail in Section 4.3.1, contains two consonants in what appears to be the posttonic syllable.

3. Impact of the mother tongue

The Egyptian scribes used Greek, a foreign language, when dealing with the administrative issues in their work. Greek had by the Roman period experienced some phonological changes that had alternated the phoneme-grapheme correspondence from the fairly straightforward system it was in the Classical period. This caused phonetically-based misspellings even for native writers, let alone persons who used Greek as a second language. The Egyptian scribes struggled with writing some of the phonemes they did not have in their native language, for instance the voiced and voiceless stops; the fact that many Greek vowels were in the process of raising to /i/ was an additional challenge that caused numerous misspellings. In this chapter I explain how native language phonology affects the writing of a second language, especially if it has a divide between the phonetic and orthographic levels.

3.1 Coarticulatory phonetics and phonological typology

Egyptian phonological influence on the Greek in OGN I seems clear enough regarding the interchangeable usage of voiced and voiceless stops as there was no such phonemic opposition in Egyptian; the historical opposition of these had disappeared and by the 2nd century CE apparently been replaced with an opposition between voiceless and ejective stops (Loprieno 1995: 40-42). However, regarding the nonstandard vowel usage there is nothing similarly distinctive as the difference between voiceness and voicelessness; furthermore, there seem to be several, often interconnected reasons behind the vowel confusion. Therefore, to account for the nonstandard vowel usage and trace the reasons behind it, phonological and phonetic processes have to be taken into account. The field of historical linguistics can be a useful source for similar studies of sound change but the modern phonetic subfields of articulatory and acoustic phonetics have added a remarkable accuracy with the benefit of measuring equipment to the studies of e.g. the effects of coarticulation, i.e. the adaptation of a phoneme to the place or manner of articulation of the phoneme adjacent to it. For very obvious reasons, acoustic analyses cannot be performed on the speakers who wrote the texts from Narmouthis but the graphemes are still there, and these are, after all, approximate representations of the phonemes the writers of the texts used when speaking.

While it is not possible to know the exact phonetic quality of the phonemes of Roman period Greek or Egyptian, enough is known of them, as is known of the place and manner of articulation of phonemes in general to make assumptions of the phonemic quality and the effects of the adjacent phonemes' quality on others. For instance, we know that /n/ is an alveolar consonant, therefore articulated at a high and frontal part of the vocal tract. We also know that it is classified as a coronal consonant, i.e. it is articulated with the front part of the tongue. Both of these features tend to cause fronting of vowels adjacent to coronal consonants, because vowels are easily assimilated to the place and manner of articulation of coronal consonants. Regarding the material at hand, there is no need to know whether the /n/ in Greek or Egyptian was alveolar, postalveolar or dental, as all of these are still produced at a relatively frontal part of the oral tract. If, however, it was a retroflex, this would matter, as retroflexes tend to cause retraction of vowels (see Flemming 2003: 335-336 for both coronals fronting vowels and retroflexes retracting them). Should this be the case, however, it would presumably show in the graphemic marking of the adjacent vowels which would probably show nonstandard representations of retraction in a consistent manner. Thus, even textual evidence of this nature can give us new information on the quality of the consonants.

Following coarticulatory effects of consonants on vowels is therefore revealing of the phonetic reality, the more so thinking of the near-phonetic nature of Coptic orthographic conventions and the probable transfer of these by the L1 Egyptian writers onto the Greek they were producing. Coptic orthography was a shallow orthography at the time of its introduction, and precise as it tried to be in its phoneme-grapheme correspondence, one of the orthographic conventions was the graphemic marking of allophones. For instance, all morphs spelled -*n* were regularly replaced with -*m* before a (non-syllabic)[22] /m/ or /p/ (Layton 2000: 20) – in other words, coarticulation showed in writing conventions, which is further proof that the study of phonemic coarticulation is fruitful regarding the language use of the L1 Egyptian writers. As the graphemic level is necessarily affected by both L1 and L2 orthographic conventions as well as the phonological levels of both languages in the cases of at least some level of bilingualism, studies of writing systems and more importantly, the second language acquisition (SLA) subfield second language writing system (L2WS) form a major part of the theoretical framework.

The strong stress accent of Coptic reduced unstressed syllables' vowels, a phenomenon evident in the nonstandard productions of the Greek vowels. The study of the transfer of the L1 prosodic system is therefore of high importance for this study. The field of phonological typology is working on phonological processes and phonetic universals and the theories of these are used to such an extent as is possible considering the written-only character of the material. However, in lack of phonetic typology as a general discipline, there is no cohesive typology of vowel reduction currently available. Regardless, phonologists and phoneticians researching this subject have formed general tendencies as to the main factors behind the phenomenon, and these are used to support the results found in this study. Below is an introduction to vowel reduction in Russian and English to give a comparison to the Coptic system.

3.1.1 Typology of vowel reduction

Coronal consonants are normally thought to cause vowel fronting, due to the fronted tongue body position required for their production. However, some coronals, such as retroflexes, have naturally retracting features, and can thus also condition retraction of the adjacent vowels. This effectively means that the vowel quality adapts to the tongue body position of the consonant: coronals produced with a fronted tongue body (like /n, t/d, s/) naturally do cause fronting of vowels and similarly, those coronals produced with a more retracted tongue body, like retroflexes, cause retraction of the adjacent vowels (Flemming 2003: 335). Coronals can also cause retraction of vowel quality if the language is going through a velarisation process (Flemming 2003: 337).

In general, the reduction of vowel quality is more connected to the phonetic duration than lack of stress. Short vowels strive toward schwa, except in languages that have vowel harmony, as in these, the exact quality of the vowel is important. There are hardly any reduced vowels in, for example, Finnish, Kera, and Mao (Pearce 2008: 120). This exception to the general rule does not, however, explain the difference between Greek and Egyptian in terms of the importance of preserving vowel quality. The spelling mistakes made by native Greek writers in the antiquity were connected to a change in vowel quality, i.e. the process of raising or unrounding of vowels that caused similar phonetic realisations of more than one vowel grapheme, thus causing confusion in the use of these. The spelling mistakes were therefore

[22] In Coptic, any consonant could be syllabic or non-syllabic, i.e. any one of the consonants could form the nucleus of a word and act as the syllable peak, and no vowel was necessary for a given syllable (Layton 2000: 28-30); however, mostly this concerned sonorants (Peust 1999: 263-264).

different from those made by Egyptian writers of L2 Greek, which had more to do with loss of vowel quality than the changing of it, and were mostly related to the stress position of the vowel. In the Roman period, /a, e, o, u/ were distinctive phonemes in Greek and furthermore, carried morphological information regarding for example verb inflection, and were no more confused with each other by native speakers of Greek than is vowel quantity by native Finnish speakers (a difficult feature for many L2 Finnish learners), or confusing /o/ for /e/ by native English speakers. Coptic stress-related vowel reduction may, in fact, be compared to those of English and Russian, two very well-known prosodic systems, even if they are slightly different in comparison with each other. In total, the Coptic stress system seems to combine the effects of both of these, English laying weight mainly on the position of the stress and then reducing the vowel quality of unstressed syllables, and Russian depending more heavily on the quality of the adjacent consonants for the precise quality of the unstressed vowels. Examples in more detail are given in the paragraphs below.

Phonetic Detail: Vowel reduction in English and Russian

In English, schwa is the dominant vowel in unstressed syllables and not permitted in stressed ones. [i, ɪ, ʊ] are also allowed in unstressed syllables; other vowels in addition to these can be found but the number of these is small (Gussmann 2002: 125). The governing factor of this phenomenon is the position of the stress, and not the adjacent consonants, as, for example, in Russian. Below is an example (8) of how the vowel quality changes between a production in isolation and in connected speech, where /a/ from ‘and’ becomes an unstressed vowel (Gussmann 2002: 124).

(8)
and [ænd] vs. *you and I* [’ju: ən ’ai]

In Russian, the reduction of vowels is governed both by the position of stress as well as the quality of the adjacent consonants, as in Coptic. The stressed position can have [i, u, ɨ], [e, o, a] ([i] with palatalised and [ɨ] with velarised consonants). The unstressed syllable can have [i, ɨ, u, ə, ʌ]. It is not possible to have [a, e, o] after palatalised consonants in an unstressed position; only [i, u] are possible. After velarised consonants, the only possible unstressed vowels are [ɨ, u, a]. Unstressed [a] can only occur after velarised consonants, as in (9), or word-initially. After palatalised consonants, unstressed [a, e, o] becomes [i], as in (10) (Gussmann 2002: 142-43).

(9)
mjagko [ˈmʲaxka] ’softly’

(10)
mjagka [mʲixˈka] ’soft (f.nom.sg)’

Before the velarised consonants, the unstressed vowel is [ʌ] if it is immediately before a stressed syllable or word-initially (11, 12); in all other positions, it is [ə], as the first vowel in (11) (Gussmann 2002: 141).

(11)
paroxoda [pərʌˈxodə] ’steamship (gen.sg)’

(12)
alfavit [ʌlfʌˈvʲit] ’alphabet’[23]

It is interesting that the phonological rule in Russian is that [a, e, o] cannot occur after palatalised consonants in an unstressed position, and only [i, u] are possible in this position. In Coptic, there can be no unstressed [o] in general, and unstressed vowel inventory contains [i] and [u] (as well as [e, a] (more about this in Section 2.3.1). Coptic had a few palatalised consonants (/ʃ/, /c/, /k/) that were all phonemic (Peust 1999: 119-125 for the history of palatalisation), so it is possibly that this was a relevant feature for the language in general (Peust 1999: 107-108). Therefore not having a mid back vowel adjacent to palatals is understandable as the quality of it would be difficult to sustain in such a position, just as in Russian. In general, Russian is a good phonological comparison to Egyptian as vowels follow the quality of the consonants, back vowels with back consonants and front vowels with front consonants.

3.2 The effects of orthographic depth and different L2 writing system

In this section I will explain how native language phonology affects writing a second language, especially one with a deep orthography, as Greek was transforming to be in the Roman period; this is especially relevant for the Section 4.1 regarding foreign name production. The phenomenon remains a bit under-researched although it is a part of second language acquisition studies but Cook & Bassetti (2005) give a particularly good introduction to the subject with many illuminating examples on how different linguistic systems emphasise various aspects of foreign language writing, so in this section I mainly follow the theoretical framework layed out by them. I will present the main findings of their studies below, concentrating on the relevant features for the study of the written Greek production by the Egyptian scribes. Among these are the differences between the orthographic depths of the two languages, to some extent the differences in the writing systems, i.e. alphabetic versus a consonantal one, as Demotic Egyptian was probably the main means of writing for the scribes, and also how the native language orthographic conventions might affect the production of the second language when using the same alphabet, which applies if the scribes knew how to write Coptic.

Orthographic depth

The term ‘orthographic depth’ refers to the consistency of grapheme-to-phoneme correspondences of orthography. Other terms used to refer to the same phenomenon are ‘transparency’ or more precisely, ‘phonological transparency’, and ‘regularity’. Finnish and e.g. Italian are often used as examples of a shallow (regular) orthography, as the grapheme-to-phoneme correspondences are direct and the rules to guide these are simple. English is used as

[23] As Gussmann’s approach is phonological, the phonetic descriptions are not quite exact. They would more accurately be (9) mjagko [ˈmʲæxkə], (10) mjagka [mʲɪxˈkä], (11) paroxoda [pərɐˈxodə], and (12) alfavit [ɐlfɐˈvʲit] (Max Wahlström, p.c.).

an example of the opposite end of the continuum, a deep (irregular) orthography, in which the relation between phonemes and graphemes is opaque and guided by many rules. In other words, a shallow orthography means that the spelling and sounds of the language fit one another one-to-one, that the language is spoken as it is written; that there is only one grapheme per phoneme, or close to it. These types of writing systems are sometimes called 'phonetic' (Cook & Bassetti 2005, 7: see also Aro 2004: 10), and Coptic spelling falls under this category.

Aro (2004) uses English, probably the best known deep orthography in the world, to explain the concept. For example, English long /i/ can be spelled in 11 different ways (*machine, me, fee, sea, field, conceive, key, quay, people, subpoena, Caesar*) and /sʰ/ in 14 different ones (*shoe, nation, sugar, issue, mansion, mission, suspicion, ocean, nauseous, conscious, chaperon, schist, fuchsia, pshaw*; examples are from DeFrancis 1989: 204). The reason behind these many spellings lies in language history, of course. Many English words are of Latin or French origin and have preserved their original spelling for mainly etymological reasons. Also, English codes morphological information into spelling, and so, for example, *nation* and *nationality* keep the same graphemic form of the root although the root in each word is pronounced differently. The aforementioned factors cause English to be considered an irregular orthography in both directions, from spelling-to-sound and sound-to-spelling, whereas, for instance, French and German are irregular in one direction only, from sound-to-spelling. This means that the reader of German and French can with considerable certainty know how a written form of a word is pronounced, but cannot always know how a spoken word is written. The reader of English can be sure of neither, and, in fact, only 23 percent of the 150 most frequent words in English schoolbooks can be read with basic knowledge of letter pronunciation. There is not, as of yet, any common measure to quantify the transparency of an orthography (see Protopapas & Vlahou (2009) for a promising start on a method, however), but the calculations of a few individual orthographies give an indication of how deep an orthography English is compared with some other European languages. 31 percent of English monosyllabic words are inconsistent on the spelling body-rime level, whereas only 12 percent of the French monosyllabic words and 16 percent of the German ones are the same. Grapheme-phoneme correspondences were not used as a basis for these calculations, which leaves the figures for inconsistencies slightly lacking, especially for English. In reality, the inconsistency figures would be even higher. This makes learning to read English a very challenging task.

To start with the direction and system of reading, left to right scanning and proceeding letter by letter is not possible with English, because in order to know which way the letter <e>, for example, is pronounced in a given word, one has to know at least the following graphemes. <E> is pronounced differently in *(h)erb,*[24] *ear, ewer* and *eight* (examples are from Venezky 1970: 129), depending on what comes next. With polysyllabic words the task becomes even more complicated as even the stress patterns can affect the pronunciation of vowels. In these instances, the entire word has to be seen before an assessment of its pronunciation can be made. At the other end of the continuum, Finnish is a highly regular orthography, almost purely phonemic and thus described as transparent. Grapheme-phoneme correspondences are regular and the number of phonemes quite small (13 consonants and 8 vowels), and besides one exception ([ŋ] → <ng>), each phoneme is represented by a single letter. Spelling is regular and consistent with pronunciation, and the number of graphemes small, so phonological recoding requires very little effort. Learning to read with this type of writing system is easy, much easier than with a deep orthographic system such as English. Compared with six other European languages (German, Dutch, Spanish, French, Swedish and Finnish), English children learned to read at a considerably slower rate than children of the other languages. 759 children, all in all, were tested by using three list-reading tasks: numeral naming, number-word reading, and

[24] /h/ is silent in many dialects, and frequently in American English (Brian Joseph, p.c.).

pseudoword reading. Pseudowords followed the form of the number-words in each language. There were not many errors in the numeral-naming or number-word reading tasks but with pseudoword reading, the difference between the English children and the other children from more regular orthographies was clear. For the English children, the level of accuracy was 50 percent at the end of the first grade, and they only reached the level of accuracy of the other European children from simpler orthographies in their fourth grade. The fastest in phonological recoding were Finnish, Swedish and Spanish children, all coming from languages with shallow orthographies. English children do start school at a very young age, the age of five, but so do the French, and although the age might be a factor, the more likely explanation for the slower reading acquisition rate of English children remains the complex grapheme-phoneme relations of the English language. (Aro 2004: 12-15; 24).

According to Protopapas & Vlahou (2009: 991; 994), Modern Greek, like French and German, is irregular in one direction only, in the feedback direction – from phonology to spelling, as e.g. the phoneme /i/ has many grapheme options. Conversely, the direction from orthography to phonology, the feedforward direction, is very regular as pronunciation from print is very regular, near to 1:1 relationship between graphemes and phonemes. In other words, it is not difficult to read Greek and produce a phonologically correct spoken language version of what is being read, but it can be a bit problematic to write it down correctly from dictation. This being said, it has been claimed even the feedback inconsistency to affect the reading performance, since words with unpredictable spelling (feedback inconsistency) are read and recognized more slowly than those with predictable spelling, but the issue needs more research. At least a detailed quantification of orthographic consistency in both directions is necessary, language-specifically.

Furthermore, it has been discovered that ambiguity does not affect all sublexical units as much, especially in more opaque orthographies. Smaller units, such as graphemes, have a tendency of gaining more inconsistency than larger ones, like orthographic bodies i.e. spellings of a syllabic rime (the nuclear vowel and the consonant following it). This is true of English monosyllabic words, to give an easy example. Readers of such orthographies thus need to develop both small-unit as well as large-unit recoding strategies to get onward with the reading, and the number of orthographic units rises alongside the grain size growing, which, naturally, affects more opaque orthographies while readers of more transparent orthographies only need to focus on the finer grain sizes (Protopapas & Vlahou 2009: 991). As the language changes that are the source of confusion between the written and spoken forms of Modern Greek were already in process in the Roman period, perhaps we can treat the Greek of the 1st-3rd centuries similarly as a semi-irregular orthography.

Writing a foreign language

In addition to the effects of orthographic transparency, one has to take into account its effect on learning to read and write in a foreign language, combined with the difficulties of possibly having to learn a new script. According to Cook & Bassetti (2005: 2; 5-6), learning to read and write in another language is not only a matter of learning a new script system; even Italian speakers tend to have difficulties with English spelling even though they share the Roman alphabet, the two languages being spelled and read differently. Things, obviously, get more difficult still with having to learn another script, e.g. English users learning Chinese and vice versa. Even with increased progress, second language writing system (L2WS) users tend to have some problems in decoding the L2WS material due to their processing it through their previously developed L1 reading and writing processes. Inefficient decoding of L2WS causes, among other things, problems with comprehension and difficulties memorizing the material.

L2WS learners simply do not process L2 material the same way as first (i.e. native) language writing system (L1WS) readers.

Meaning-based and sound-based writing systems

Furthermore, Cook & Bassetti differentiate between meaning-based and sound-based writing systems in how they correspond with the spoken level of the language. Meaning-based writing systems connect graphemes to meaning directly, (seemingly) disregarding the phonetic value of the word. For instance, the Chinese phonemic value /wən/ can mean several different things depending on the written symbol. Morphemes being presented as logographs have the benefit that regardless of the dialect or language, for instance, people from different parts of China or, indeed, Asia, may read the same symbol and understand it to mean 'written language' or 'writing' – in Japan, the same written symbol is pronounced /bun/ but means the same, as does the Korean /mun/.

This does not mean that ideographic writing systems such as Chinese, Japanese or, indeed, Ancient Egyptian, do not have elements of phonology coded into them. They do, in fact, contain phonetic radicals, signs that are added to logographs, giving a clue to the pronunciation of the word. Not all so-called logograms contain only semantic information; for instance Chinese, largely considered a perfect example of logographic writing, codes phonetic information, accurate enough to make confusing the sign to another one unlikely in as many as 66 percent of its signs; in 42 percent of all signs, the phonetic indicator gives accurate enough information about the syllable structure for the sign not to be confused with another sign in most contexts, even if the radical is missing. In 24 percent, the radical is useful regarding understanding the meaning but without it, the phonetic radical still gives a clear enough indicator of the syllable that a good guess in the context might prove right. This means that a large portion of all Chinese characters are, in fact, phonetically coded to facilitate reading and understanding of the meaning of the sign. This means, as stated by Unger & DeFrancis (1995: 52-53), that Chinese is not a logographic writing system but mostly a syllabo/phonographic one – a character can really only be called logographic when it gives no indication of the syllabic structure or phonemic value of a word.

However, in this study we are concerned with Coptic and Greek, sound-based writing systems, which work on a different principle, and are varied in form. They connect graphemes with the sounds of speech, and the whole entity of the word forms the meaning of the word. Japanese, for instance, is a syllabic writing system in which a grapheme is (most often) the equivalent of a spoken syllable. Hebrew, and Afroasiatic writing systems in general, although sound-based, are further classified as consonant-based as vowels are usually not written at all. Thus, when learning to write their L1, Hebrew children first write the language using diacritics to represent vowel signs. Regardless of the usage of vowel diacritics, they still learn to write consonants before the vowel sounds, possibly because consonants carry the meaning of the words, or because they have such a central role in the writing system. (Cook & Bassetti 2005: 6; 18).

In sound-based systems, spelling is naturally affected by the level of the orthography's phonological transparency. German children are more successful at spelling than English ones; English children not only made more errors, but also more varied ones, e.g. 22 different spelling versions of the word 'friend'. The level of orthographic transparency of a language also affects the type of phonological awareness needed for recoding the written word. English beginner readers, for example, use their rime awareness skills but Greek children do not – this has to do with the fact that Greek has a much higher orthography-phonology correlation and is read at grapheme level instead of longer units, like English. Analogy has also been detected to be a

major factor for English beginner readers, as if first presented a real word and then a pseudoword, the writing form of the pseudoword is in direct accordance with that of the pseudoword. Thus, the pseudoword /prein/ is spelled <prain> if it is next to <brain> and <prane> if it is next to <crane>. What is also interesting is that while both phonological and morphological awareness are important in most writing systems in the world, the importance of this varies language-specifically. For spelling skills of English children, for example, the correlation with phonological awareness is much more important than to the learner spellers of Hebrew and Chinese; e.g. for Hebrew, which can be compared to Egyptian due to its similar structure linguistically, morphological awareness plays a much bigger role. (Cook & Bassetti 2005: 18-20).

The type of spelling errors that seem to have been formed by analogy as shown above are seen quite frequently in Greek papyri, with nonstandard repetition of the same vowel as was in the preceding word or syllable, as in for example OGN I: 114 with the standard *para* written *pare* because the following word starts with /e/ (see Section 4.3.1.2, 'Scribal errors'). In addition, the tendency of Hebrew children to look at words in a more morphologically oriented way is also relevant for this study as it is because of the pattern-and-root word forming principle in Afroasiatic languages, and may have contributed to the unaccurate marking by the Egyptian writers of the Greek standard vowel values; the word was seen as a morphological 'root' formed by a consonantal skeleton. Therefore many of the features listed above affecting the writing of a second language are relevant for this study, starting from the point that Greek, the second language, was a non-transparent orthography, and continuing with the different language perception of the Egyptian (Afroasiatic) writer. However, these are not the only aspects related to the learning of a L2WS. It is also important to differentiate between cross-linguistic and cross-orthographic types of transfer.

Cross-orthographic transfer

Cross-linguistic transfer means the interference of L1 phonology, morphology and syntax and other purely linguistic elements; cross-orthographic means things such as orthographic conventions, phonological transparency in relation to the writing system, and written morphology. These are highly relevant for the studying of a written language contact situation with structurally very different languages, as will be seen in the analysis chapters 4 and 5. According to Cook & Bassetti (2005: 26-27), phonologically transparent writing systems are always easier to learn than those less so, regardless of the L1WS. For instance, English-Hebrew bilingual children learning to read decode L2WS Hebrew faster than L1WS English, because when marking the text with vowel diacritics (as is the custom for children's books), Hebrew is phonologically more transparent than English. L2WS learners are at an advantage compared to L1WS learners regarding the fact that they have already learned one writing system and therefore know some basic facts about writing, as for instance that there is a preordered direction to the sequence of the symbols. On the other hand, the L1WS system might confuse them; for instance, English learners of L2WS Japanese have learned in their first language that the length of the spoken word roughly corresponds to the length of the written word, but this rule does not apply to Japanese, where one *kanji* can mean two different words of different lengths, like /ko/ and /mizu:mi/.

An important and a reasonably obvious point related to the study of the Egyptian scribes' language use is that a person from a consonantal L1WS background learning an alphabetic script tends to rely more on the consonants than the vowels. Arabic readers learning English were asked about a possible difference between two words with the same consonants but different vowels, and it transpired they tended to ignore differences in vowels. In general, they

regarded the use of vowels in the script as "too much information"; on the other hand, American learners of Japanese remembered those *kanji* easier that had a phonetic radical, this providing them with a phonological clue in the otherwise morphemic characters. Furthermore, L1WS can affect L2WS through phonological transparency even when both writing systems use the same script. The results can be very surprising: a reader from a L1 phonologically transparent writing system will use grapheme-phoneme recoding to read a L2WS that is phonologically opaque, such as a Spanish L1 reader trying to make sense of English words (or indeed an Egyptian reading Greek, provided that e.g. the Narmouthis scribes knew how to write Old Coptic i.e. Egyptian with Greek letters). This, regarding the English orthography, is unnecessarily time-consuming, as proven by the fact that an L1 Japanese reader will make sense of the English word faster, using his natural habit of whole-word recognition learned for his L1WS. (Cook & Bassetti 2005: 39-40).

Cook & Bassetti (2005: 40-42) have results on orthographic conventions creating another sort of problems, which might be important for future studies regarding the transfer of Coptic orthographic practices on second language Greek writing. Traditionally, L2WS research has not focused on finding effects of L1WS on L2WS, and some researchers in the field have been of the opinion there are none. Complications also rise from the fact that both L1 phonological and writing system related issues can be seen to cause a L2WS misspelling. For instance, the confusion Japanese have between /l/ and /r/ has been put down to both L1 phonology and the writing system, *romaji* (*romaji,* the Japanise romanisation system, does not mark <l> but has <r>), and it can be either one or both together. If there is little research on L2WS spelling, there is an area of research even less studied: the effects of L1WS orthographic conventions on L2WS.

L1WS orthographic conventions

For instance, adding interword spacing affects the eye movements of L1 English readers of L2WS Chinese but not the L1 Chinese; similarly, if the boundary between the preposition and nouns in Hebrew is marked, reading becomes easier for English and Russian L2WS readers but not for L1 Hebrew readers. In writing, some aspects of the target language writing system affect the results instead of L1WS transfer being a factor. For instance, English learners of L2WS Hebrew have been known to misspell vowels when asked to write Hebrew using the vowel diacritics, consistent with the fact that this is not a normal practice they have learned when writing Hebrew; normally, spelling is an area where L2WS learners perform well. On the other hand, both the phonology and the writing systems of L1 might affect the spelling of the L2WS. Good examples of this are the Japanese learners' productions of L2WS English words 'recentry' ('recently') where confusion between /l/ and /r/ is clearly seen, as well as the word 'yesuterday' ('yesterday').

Perhaps a bit surprisingly, L2WS learners with a Roman alphabet L1WS background make the most spelling errors, more than Chinese, Japanese or Arabic learners. It has also been noted that L1WS affects the L2WS spelling processes and strategies; for instance, a German high-school learner of L2WS English used L1 letter names to spell L2 names, and L1 phoneme-grapheme correspondence rules in spelling <station> as <steschen>. A Welsh student of L2WS English used <c> instead of <k> because Welsh does not have <k>; likewise, he spelled <ship> as <sip> because Welsh marks /ʃ/ with <s>. Not only did the GPC (grapheme-phoneme correspondence) rules of his L1WS affect his spelling of L2WS, but also L1WS spelling conventions: for <nephew>, he spelled <neffew>, because in Welsh, <ph> for /f/ is limited to word-initial position usage. Learning L2WS rules might also help remember orthography. A good example of this is the English past tense marker <ed>; L2WS learners are taught this is

the written morpheme marking past tense, in all cases, and they learn it quicker than L1WS English children. Reasons might be varied including the difference in age of the writers, but probably one of the reasons behind the confusion is that L1WS English children get confused with all the different phonological variants regarding the morpheme and, probably, quite often, try to write it phonetically while not yet remembering the standard form, thus deviating from the standard orthography.

Reverse transfer from L2WS to L1WS

As can be seen from above, there are many aspects how L1WS and L2WS may affect one another, linguistic as well as nonlinguistic, such as directionality (direction of writing, letter shape forming either left to right as in English, or top to bottom as in Chinese) and an obvious one, transfer from L1WS to L2WS, but what is perhaps a bit more interesting is reverse transfer from L2WS to L1WS. Compared with the idea of an L2 multi-competent user, there seem to be multi-competent L2WS readers who have the two different writing systems integrated in their minds in a co-existence. These people use their L2WSs differently from an ordinary L1 user using their L2WS; they also use their L1WS differently from an ordinary L1 user using their L1WS. They might, for instance, use their L1WS to code the pronunciation of the L2WS, like the Japanese marking down English pronunciation using their *furigana* (*kana* symbols used to mark the pronunciation of infrequent or difficult *kanji*). Or they might create L2-specific reading and writing strategies of dealing with a L2WS such as using L1WS rules to sound out unknown L2 words, or spelling unknown L2 words using L1WS orthography. This effectively means a new type of writer/reader, who adapts the processes and strategies they have learned for one writing system to the cognitive needs of using another one, making him/her a more competent language user than the ordinary monocompetent L1WS reader; L2WS readers of English might, for example, easier detect the word-final silent <e>s in texts than do English L1WS readers. Multi-competent L2 readers might also use code-switching, take notes in one language when reading another, and generally take advantage of all the writing systems they know. (Cook & Bassetti 2005: 44-47).

In the Demotic-Greek bilingual documents of Narmouthis, the Egyptian scribes seem to have done exactly this when interspersing Greek words into an otherwise Demotic Egyptian text (Fewster 2002: 222-223). The Egyptian scribes must have been affected by the difference of the scripts, using a consonantal writing system, Demotic, alongside the alphabetical Greek but in addition to this, they would also have been affected by the level of L1 phonology, differing from Greek in many respects, and, to an extent, also by Coptic spelling conventions, made all the more effective as the emerging system for writing Egyptian at the time of the Narmouthis ostraca, Coptic, was in fact in the same alphabet as was their L2WS, Greek.

3.3 Loanword phonology and second language acquisition (SLA)

Loanword phonology is a subfield of second language acquisition (SLA) studies (more recently considered also part of contact linguistics and theoretical phonology). By no surprise, it concentrates on how loanwords and foreign words are integrated into native language phonological system. Since most of the material analysed in this book concerns nonstandard forms of administrative terms in a language contact situation and foreign name transcription, loanword phonology seems like a natural theoretical framework within which to work,

especially since SLA studies in general mostly concentrate on modern languages that are still spoken. The basic principles I follow are from Haugen (1950), Weinreich (1953), and Major (2001).

In addition to using the loanwords phonological research mentioned above, I also try to take a stance in the debate about whether loanword adaptation is phonologically-based or phonetically-based. E.g. La Charité & Paradis argue that it is mainly phonological and based on the identification of the phoneme categories of the source language, in a largely bilingual situation; they claim that phonetic approximation plays a limited role in the process by which loanwords become integrated into native language phonology (La Charité & Paradis 2005: 223). On the other hand, Peperkamp & Dupoux (2003) think loanword adaptation is solely phonetic and based on the acoustic perception of the foreign word. Both of these views seem to hold true for many of the nonstandard Greek forms produced by Egyptian writers, as well as Greek and Arabic loanword renderings analysed in this book, and indeed there is a third view: Dohlus (2005) thinks loanword adaptation is both phonological and phonetic, and this is the view taken in this book. Evidence of this is available in Chapters 4 and 5.

3.4 Language attitudes

Finally, the attitude the Egyptians seemed to have for the usage of their own language is worth considering; it is possible they transferred their linguistic attitudes to Greek, as well.

Like Chinese, the Egyptian script consisted of more than one type of element. It used logograms, i.e. drawings of objects and actions (as an example, one might use the logogram of 'leg' meaning the body part and the logogram of 'legs' (two of the same), meaning 'to go') as well as the rebus principle, i.e. the usage of logograms that had the same phonetic content as did another word (or part of word) with a different meaning; they were used as phonograms (Allen 2010: 2-3; see also Lincke & Kammerzell on the use of Egyptian classifiers in written text with e.g. 'Seth' being written in four different ways all sounding the same (Lincke & Kammerzell 2012: 59)). Even in Middle Egyptian, it was a regular practice for the scribes to switch between <s> and <z>, for instance, as there was no longer at that point a phonological opposition between these phonemes (Loprieno 1995: 34).

Hieroglyphic signs were organised in square or rectangular shaped groups according to the size and shape of the individual signs in the words and in symmetrical groups pleasant to the eye (Allen 2010: 5; also Peust 1999: 42) - this means that the individual signs forming the root of the word were not always in the correct linear order (or not there at all; see Allen 2010: 19-20), but rather in an order that would fit the line of writing in an aesthetic way; the writers of the text relied on the reader's ability to draw the meaning from the context. According to Allen (2010: 31-32), scribes often seemed to create nonstandard hieroglyphic spellings for reasons of aesthetics, and perhaps even the desire for variation or 'playfulness'.[25]

In addition to simply relying on context, there were determinatives, logograms that represented the sphere into which a particular word belonged; this made it clear which semantic meaning was meant in each context for a word whose spelling could mean several things or, indeed, if the spelling for aesthetic reasons did not follow the standard. It has been argued that an alphabetic writing system is superior to others, but this is not necessarily the case. Although the Egyptian script lacked a certain efficiency due to having so many signs (ca. 6000 signs, of which in active use were approximately 700), the mixed orthography of it had the advantage of

[25] However, Lincke & Kammerzell (2012) claim that the use of classifiers, i.e. for example phonetic determinatives, was far more structured than has previously been thought.

creating visually distinctive and easily recognisable patterns; the organisation of hieroglyphs in square formation made the writing system, in fact, more legible. (Gaur 1995: 20-21).

It is possible that part of the orthographic chaos of the Narmouthis ostraca's Greek is simply caused by a transference of the L1WS: Demotic was in use simultaneously with hieroglyphs, so the attitude toward symmetrical grapheme formation and flexibility had an effect on Demotic Egyptian writing; similarly, scribes thus writing Demotic, as were the ones in the Narmouthis temple, could have transferred the system and idea to Coptic, a preliminary form of which was in use in the Narmouthis area in the time of the texts. This possible transfer of the lesser role and lower degree of standardisation and orthographic prescriptivism in the L1WS of the scribes might be one of the factors behind so much nonstandard usage in Greek texts in Egypt.

PART II: PHONOLOGICAL ANALYSIS OF THE NARMOUTHIS OSTRACA

4. Phonological analysis of the Greek in OGN I

In this chapter I will analyse the nonstandard writing forms in OGN I. First I will introduce the nonstandard consonantal spellings and then the ones regarding nonstandard vowel graphemes. As the main purpose of this study is to find answers for the nonstandard vowel usage, the subsection regarding consonants will remain a short outline of the situation, provided here mainly as strengthening evidence for the nonstandard vowel spellings to be considered as similarly influenced by Egyptian phonology. In this section, I give a brief introduction to the subject at hand. The analysis of the Greek usage in OGN I follows in subsequent sections.

As mentioned, Egyptian influence is clearly visible in e.g. the fluctuation between voiceness and voicelessness of stops whereas reasons behind the nonstandard vowel orthography are often opaque and multicausal. For most phenomena, however, explanations are found from the influence of Egyptian, phonological as well as that of the differences in between the writing systems. The Greek of the Narmouthis scribes is later compared to the nonstandard usage of Greek loanwords in Coptic, in Section 5.1.

As explained in Chapter 3, for Narmouthis ostraca, it must also be taken into account that both native language writing systems, Demotic Egyptian and Coptic, possibly played a role in the second language production. Given that Narmouthis collection is bilingual and Demotic Egyptian is the Egyptian writing system used for the bilingual and Egyptian documents, it can be assumed that the complete lack of vowel graphemes in their native language writing system could have affected the scribes' aptitude for writing with an alphabet. However, the phonological system of one's native language can be reflected on the orthographic level even within the same writing system, and as Coptic Egyptian was by and large structurally the same language as the stages before that, the tendency for word formation based on consonants is still visible regardless of the vowel graphemes available in Coptic. This is easily witnessed by the nonstandard usage of Greek loanwords in Coptic, which look by all accounts similar to alphabetic writing produced by a writer with a background in a consonantal writing system (see Section 3.2 for the examples of second language writing systems).

I will proceed by analysing the phonemic and prosodic levels of the language. Because there is so much nonstandard variation based on what are clearly representations of the spoken language, I have used loanword phonology as the theoretical framework because of the large similarity of how the nonstandard writing forms of foreign words in the Narmouthis ostraca relate to loanword integration in native language phonological patterns. This is often a process that could take generations of language users to coin the words into their standard forms, and the stages in the middle represent various adaptations that are based on the knowledge of the donor language phonology and often also orthography, represented within the limitations of the recipient language system. As a result, the in-between stages may have forms that are based either on the phonological or the phonetic form of the word, as perceived by the L2 language user, and the written form may also have traces of the original form's orthographic form.

For example, English terms *psychology* and *geography* are mixed forms in which some elements rely on French orthographic rules, from where the orthography for the form *-logy*

comes: French reduced the final syllable thus producing [-i] not [-ia][26] so this is a phonological adaptation of the Greek original. Note, however, that the first part of *psychology* has retained its original graphemic form with the initial consonant cluster *ps-* even though this is against English phonotactic rules and pronounced without the initial /p/; in this form, the form of the original Greek orthography has been retained.

As mentioned, Dohlus (2005) presents a good case for loanword adaptation based on phonological, phonetic and orthographic forms, respectively, with French and German loanwords in Japanese. Whether loanword adaptation is phonological or phonetic is a matter of some dispute among the researchers in the field, as stated in Section 3.3. Dohlus manages to convince that it can, in fact, be both or one or the other, and that knowledge of second language orthographic practices can also have an effect. Researchers opting for the phonological stance work from the presupposition that loanwords enter the language mainly or even only through the usage of them by bilinguals. This is probably true in many cases, but there are many levels of bilingualism, and if one is not limiting the term strictly to fluent bilinguals who are born and raised with two equal languages (and often in contact linguistics this is not the situation, nor the definition), this should be taken into account. Many almost completely monolingual people will always try to use words from a fashionable prestige language, even if real working competence with that language is limited. This situation can be seen all around the modern world with the limitless examples of nonstandard English, be they orthographic, morphosyntactic, or phonological - so many, in fact, that comical books have been compiled of e.g. restaurant menus, road signs, and advertisement material. There is no reason to think similar practices of usage of the prestige/lingua franca forms were not used in antiquity as well by language users with limited or non-existent skills of the dominant language, and evidence for this is, in fact, even provided within the very collection of the Narmouthis texts, in the codeswitching practices of the scribe apprentices presented in Introduction.

This type of nonstandard production produced by people with no great level of knowledge of the foreign language is mostly phonetically based. The language users often have no comprehensive idea of the second language's phonological system, and therefore the nonstandard L2 forms are based on the auditory perception of the second language, which involves misrepresentation of foreign phonemes, influenced by native language phonology. According to Bybee, sound change that creates allophonic representations of phonemes is always phonetically conditioned, from which can be concluded that the distribution of allophones can be stated in phonetic terms (Bybee 2008: 115). This is true of allophones that are the result of coarticulation, but the Coptic phoneme distribution rule according to which /o/ cannot occur in an unstressed syllable and is there often replaced by /u/ is prosodic. Prosodic, and phonotactic, rules tend to be seen as phonological, as they are a fundamental part of the languages stable system, but there is a phonetic element to this rule: the unstressed syllables in Egyptian are greatly reduced in quality, so a clear distinction of vowel quality is perceptually difficult to hear, which is probably the reason for the phoneme distribution. Perception, in turn, is phonetic in nature, and is actually a phenomenon related to language change: Egyptian did traditionally have a strong stress accent, but by the time of Coptic, there had been fundamental changes to the language that also affected the stress patterns. Egyptian had been structurally changed from synthetic to analytic, which, among other things, meant a vast increase in the usage of prefixes instead of suffixes (Loprieno 1995: 6-7). This changed the stress formation somewhat, creating bound-stress groups (Layton 2000: 22-23; 26-27) from the strings of prefixes and lexical words. In addition, the force on word stress had diminished, resulting in most words only having one clear vowel, in the stressed syllable, reducing all other vowels to

[26] Oxford English Dictionary Online. Furthermore, *psychology* and *geography* are new formations (i.e. not Greek originals as e.g. *theology* and *astrology*), although it might legitimately have existed in Greek (other word of this kind are e.g. *geology*, *zoology*) (Oxford English Dictionary Online, accessed 9th May 2017).

schwa. The result is, therefore, language change induced weakening of unstressed vowels, perceived on the phonetic level, although part of the Egyptian phonological system. The divide between phonological and phonetic levels is therefore not always completely separable, which can be seen in the treatment of some of the nonstandard forms produced by the Narmouthian scribes.

One thing that has previously not been considered to cause Greek nonstandard spellings is transfer of native language stress. Horrocks remarks that nonstandard orthography mostly occurred in the unstressed syllable, but Gignac provides evidence for it in all positions for all vowels (details of these views in the following chapters). According to Girgis, the quality of Greek stressed vowels was mostly retained in Greek loanwords in Coptic, but nevertheless he cites cases in which especially stressed <e> has been replaced by other vowels; <a>, <y>, even the supralinear stroke (Girgis 1966: 87-88). It is natural that vowel quality might become unclear in an unstressed position, and this is mirrored in the universal tendency of vowel reduction: in many languages, the unstressed syllable carries a smaller inventory of vowels possible for articulation. So, even though the number of instances where vowel quality is altered in the Greek stressed syllable is smaller, in my opinion it calls for an explanation – why would a stressed vowel suddenly become audibly unclear?

In loanwords across languages there are some cases where they have been adapted not only by replacements of native language phonemes but also by L1 stress rules. Examples can be found in English, where e.g. the French loanword *liberty* from the original *liberté* has been modified phonemically as well as prosodically. This type of stress rearrangement does not include all loan vocabulary and is therefore not always easily detected. As pointed out by Weinreich (1979: 28), treatment of loanwords is as faithful as possible, and it seems that when the foreign stress position is not too difficult for the recipient language, it will be kept faithfully. In some cases this apparently does not seem possible, and the native language stress rules are used. I believe there are some instances to this effect in the Narmouthis scribes' treatment of Greek. Egyptian and Greek were both stress-timed languages in the Roman period, with similar syllable structures (see Section 4.3.2.3 for further clarification). Therefore their stress rules quite often coincided and Greek stress was not required to be replaced by the Egyptian system to be acceptable to the Egyptian ear; in other words they might have been treated according to L1 prosodic rules, but this did not show in any way as they were the same ones for Greek in many cases. Those words that are treated differently, however, might give some interesting new information about the Egyptian stress system in the Roman period; it also gives an explanation why some Greek stressed vowels apparently underwent a reduction in quality when this was mostly supposed to occur only in the unstressed syllable.

The Narmouthis scribes' Greek production falls partly under phonological adaptation. The scribes were aware of some aspects of Greek standard pronunciation and how this was transferred to the orthographic level, but native language phonological rules were used in the adaptation, especially regarding the Egyptian phoneme distribution in relation to stress patterns. This, in some instances, created some phonetic forms wherever the nonstandard phoneme was depicting an auditory perception of the most unstressed of phonemes, a word-final schwa. Some forms are also only phonetic. In these, the written form is an approximation of how the word was perceived, often influenced by native language allophonic rules and consonantal coarticulation, such as the many nonstandard graphemic variants regarding /i/ and /e/. Knowledge of both L1 and L2 orthography is also seen in many writing forms, and by L1 writing system, I am here referring to Coptic, on however preliminary a stage this was.

The phonological analysis of Greek is divided into three sections according to the phoneme replacements they represent. One common thing to all these different patterns of L1-influenced nonstandard Greek spellings is that mostly, they occur in the unstressed syllable.

The key question is whether the syllable is counted as unstressed according to the Greek or the Coptic prosodic rules.

I have separated forms that look like obvious scribal errors into a separate section. These include examples of nonstandard grapheme variation where e.g. the last vowel of the previous word is repeated at the beginning of the next word (for example OGN I: 114 παρὲ *pare* from παρά *para*).

I have also separated cases that have a clearly morphological reason, for example a mix-up between cases or verb inflection behind the nonstandard form, into a section of their own. Sometimes, however, it is not possible to decide between morphological and phonological confusion, and these can, in fact, go hand in hand; often, also the orthographic conventions of both L1 of the scribes as well as the L2 they are using play a part in the nonstandard production. I have therefore sometimes included these types of unclear instances in the analysis but proceed with extra caution when presenting my hypotheses of the phonological level being the factor behind the nonstandard outcome.

4.1 Names

The level of standardisation is very different between names and other vocabulary. Names often have syntax distinctive from other syntactic categories; languages seem to have a separate class of vocabulary with basic syntactic and morphologic organisation, connected to the least controversial, traditional idea of what a name is (Anderson 2007: 3-5). But while the morphosyntactic rules of name formation have been studied, albeit not extensively, the phonological level of foreign name usage remains almost untouched. Luckily evidence to some degree can be found from second language speech perception studies.

A wide range of authors (e.g. Strange et al. (2008) on speech perception related to second language acquisition) have concluded that adult L2 learners have difficulties perceiving and reproducing phonemes that are very similar but acoustically non-identical to those in their native language phoneme inventory while it is easier to detect and produce phones not existent in their L1. This is contrary to the previously believed notion of second language learners working through their L1 phonological system, predicting uniform perception of L2 phones regardless of their differences in quality compared to the L1 phones (Van Guilder 2007: 1). It is seen that second language pronunciation is, in fact, often a mixture of L1 and L2 phonetic rules, in technical terms called interlanguage phonology (see e.g. Strange and Shafer 1995: 153).[27] There are understandable psycholinguistic reasons behind this: as encapsulated by Major, having similar sounds in one's native language, the minimal differences might not get noticed, and the target language (TL) remains imperfectly learned. On the other hand, the gross differences are perceptually more salient, and therefore receive the language learner's attention, resulting in better learning these foreign phonemes (Major 2001: 37).

This seems certainly to be true of the Narmouthis scribes' confusing of /y/ and /u/ - these sounds are similar in that they are both close rounded vowels, but acoustically they are different. When vowel quality is measured with a spectrogram, the first formant, F1, corresponds to vowel openness and F2 to its frontness. Open vowels have high F1 frequencies whereas close vowels have low ones; back vowels have low F2 frequencies and front vowels have high ones (see e.g. Reetz & Jongman 2009: 182-184). /u/ and /y/ both have same high F1 frequencies but differ in their measurement of F2. However, while the same might be said of /o/ and /u/, the source of difficulty regarding the realisation of these phonemes is not underdifferentiation but related to Egyptian prosodic rules.

[27] The term was originally coined by Larry Selinker (1972), as were the concepts L1 transfer and fossilisation.

Egyptian names had Greek standards (see Preisigke's (1922) *Namenbuch*) to the point of having a Greek inflectional system (Pestman 1993),[28] but these were not always heeded (see especially Leiwo 2003 about this). Names are personal and in many languages treated differently from other lexicon, despite the fact that they are commonly drawn from common noun vocabulary (Anderson 2007: 5-6). For instance, in Finnish, the inflection of names which have a common noun of the same form is often different, and case-specifically decided according to the name owner's own preferences. Therefore e.g. the possessive form of *Helmi*, a personal name also meaning 'pearl' can be inflected *Helm**i**-n* 'Helmi's', when a common noun with the same form is inflected *helm**e**-n* 'pearl (gen.)', with a different vowel at the end of the stem. There are numerous examples of the same phenomenon, and usually the name owner will choose for her/himself which inflection s/he wants to be use.

It is therefore understandable that a Greek modification of an Egyptian name could for the owner of the name feel wrong, and therefore to be written in another way to better sound out the reality of the Egyptian original. Equally likely, the Greek standard was sometimes merely not remembered by the writer, and creativity was used to produce the Egyptian name in as reliable a phonetic form in Greek as possible. But Greek names were also used by Egyptians; many Egyptians had a double name, an Egyptian one and another one that was Greek, for prestige reasons. Having a Greek name did not require possessing Greek language skills (see e.g. Vierros 2012: 45-49) and consequently, without knowing Greek, the name could come to have an Egyptian phonetic form that showed on the orthographic level.

The strong link between L1 phonology and perception and transcription of foreign names was proven in a cross-language speech perception test in which one hundred native speakers of American English participated in a web-based experiment in which they worked under a scenario of being telephone operators, typing foreign names and nonsense words as for a pretend database lookup. The test subjects listened to foreign names recorded by speakers of Jordanian Arabic, Hindi, Mandarin Chinese and Thai. They were allowed to listen to the word or name for a maximum of four times before having to choose the writing form for it. As explained in Section 3.2, English is a deep orthography so for many phonemes, there are numerous graphemic variants producing the same phonetic result. In 98 percent of the instances in Van Guilder's study, the spellings the test subjects provided were, as expected, the unmarked, high-frequency alphabetic sequences that were the most common alternative for a given phoneme, as determined by a phoneme-to-grapheme frequency analysis of two English lexicons; i.e. in most cases, the spellings were nearly phonetic (Van Guilder 2007: 143-144).

The results gained from Van Guilder's study, regarding their strong link between L1 phonology, phonetic representation matching the acoustic input, and sometimes orthographic conventions, are similar in style to the nonstandard orthographic forms written by the Narmouthis scribes for L2 Greek. The Narmouthian Egyptian scribes, equally, produced written language in which very often, the phonetic level had a part, be this in the form of reading out loud while writing, writing from dictation, or writing silently in a language with deep orthography. Especially in the nonstandard forms of names, for which there often were no definite standards, creativity was used to match the graphemic level with the phonetic one as faithfully as possible, within the scope of rules for loanword/foreign word phonological integration. To conclude, names in Egypt, Egyptian and Greek alike, had various co-existing forms with some (often vowel) alterations. Nevertheless, all of these should not be disregarded when looking for evidence for Egyptian phonological transfer. Like the imperfect learning of the scribes, the lack of strict standardisation in names can give ample evidence for phonological level precisely because often orthographic standards, which in Greek at this time were already

[28] If an Egyptian name ended in a (weak) vowel, the ending -ς <s> was added; if the name ended in /t/ or /d/, the ending -ης <ēs> was added; if the name ended in another consonant, -ις <is> was added. (Pestman 1993: 485.)

divided from the phonetic level, were not remembered and therefore not used, and thus no standard writing form was masking the quality of the phonemes used in the spoken language.

4.2 Consonants

Weinreich writes about the interlingual identifications, i.e. speakers of two languages hearing the same phonological unit in the two languages as the same phoneme, based on only some similar-sounding renditions of them in e.g. certain words. This can include attesting the same phonemic quality on a single phoneme or it can even affect the perception of a whole word, as in the case of a Yiddish-English bilingual thinking English *cold* and his dialectal Yiddish /kɔlt/ 'cold' represented phonemically the same word (Weinreich 1963: 7).

This same phonological principle applies to the Egyptian writers' usage of Greek stops: Coptic did not have the opposition between voiced and voiceless stops so they were frequently confused with one another in Greek papyri, evidently representing a single phoneme for the Egyptians (see e.g. Gignac 1976: 77 and Horrocks 2010: 112). According to Gignac (1976: 64), there is "considerable confusion" between various Greek stop consonants in the papyri with γ <g> and δ <d> interchanging "very frequently" with κ <k> and τ <t> while β <b> does so "occasionally" with π <p>. Numerous examples of this phenomenon are shown in pages 64-101 making this the most evident phonological phenomenon recorded by Gignac.

The reason for the lesser amount of variation between β <b> and π <p> is also explainable through Egyptian phonology: Greek /b/ had largely shifted to the fricative /ß/ which also existed in Coptic so some Egyptian speakers identified it with the phoneme of their own language. Similar variation existed between the voiced and voiceless sibilants, again due to Egyptian influence (Coptic only had the voiceless counterpart /s/); there was also variation between the liquids /l/ and /r/, mainly in the Fayyum area, due to the dialectal feature of Fayyumic Coptic regarding this (Gignac 1976: 64 (/b/), 120-132 (/s/), 102-110 (/l, r/); Horrocks 2010: 112). Curiously, there is no variation in the Narmouthis ostraca within liquids, similarly to an old Fayyumic manuscript *P.Hamb.bil. 1*. I shall come back to this matter.

There is no doubt that this is a contact-induced phenomenon related to the fact that the speakers of (Coptic-)Egyptian did not have this phonemic opposition in their native language and the distinction of it was therefore difficult for them. As Gignac says (1976: 85):

> "The identification of voiced and voiceless stops has no satisfactory explanation in terms of Greek phonology. The original oppositions between these orders have remained in Modern Greek even though the voiced stops have uniformly shifted to voiced fricatives. This identification occurs in the papyri from Egypt through bilingual interference from the Egyptian language. Parallel phenomena are found in the spelling of Greek loanwords in Coptic."

In Narmouthis ostraca, there are numerous examples of the voiced/voiceless stop confusion, for example ατελφω <atelfō> from ἀδελφῷ 'brother (dat.)' (OGN I: 103) and χωρτηκία <kʰōrtēkia> from χορτηγία < kʰortēgia> 'harvest' (OGN I: 115). OGN I: 31 also displays the usage of the supposed /ß/ in Βολβος <Bolbos> from Βολβῆς <Bolbēs> (personal name); an example within this small corpus to prove that <b> and <p> had less variation than the other stops. There is no question as to the origins of this, it is undoubtedly the influence of Egyptian. The real question is this: if phonological impact from the scribes' mother tongue is this clear regarding their nonstandard use of Greek consonants, how would it be possible that there were

no transfer effects on the vowels? The answer is simple, it cannot be possible; the native language must have an effect also on how Greek vowels were perceived. Reasons behind the nonstandard usage of Greek vowels are not as easily analysable as those behind the nonstandard usage of consonants, and it is of course clear that even the scribes' nonstandard representations are partly based on the acoustic perception of the vowels as spoken by native Greeks. Regardless, evidence of Egyptian phonology can be found when the phonological systems of the languages are compared, and examples of this are presented in the following sections.

4.3 Vowels

There is considerable nonstandard fluctuation in the vowel usage of OGN I Greek, atypical for native Greek writers in many respects, in e.g. confusing vowels that are still distinctive in Modern Greek. Following the nonstandard depiction of Greek voiced stops /g, d/ and sibilant /z/, it seems likely that the vowel usage is equally based on Egyptian phonological impact. Regarding the vowel usage, however, the situation is less clear and in many cases multicausal, reflecting both the phonemic level and language-specific orthographic practices, and draws influence from both directions, both Greek internal phonological development and Coptic phonology. There is a tendency of writing voiceless stops instead of the standard voiced ones and the same thing in reverse in hypercorrective manner, which is clearly stemming from Coptic phonology, but the same thing cannot be said to the same extent for the nonstandard vowel usage in the Greek texts.

Coptic and Greek shared many vowels in their respective inventories, and when they did not, the differences in quality were minimal (for instance between an open-mid and close-mid front vowel /ɛ/ and /e/ in Coptic, and close-mid and near-close front vowel /e/ and /e̞/ in Greek). This means that if a text was dictated, from spontaneous speech the distinctive quality might not have been clear, if coming from a native Greek speaker or one with native-like phonetic outcome, to a second language user whose native language was Egyptian. If, on the other hand, the source for Greek came from a second language speaker, it is likely that in many cases, the phonetic level would have been influenced by that of his L1, and therefore the little distinctions would have been lost that way. In effect this means that the Greek front vowel raising might not be the only reason why *eta* is sometimes written as *iota* in Greek texts written by L1 Egyptian writers – it is equally possible that the Greek near-close /e/ sounded to a native Egyptian speaker like an /i/ because that was the closest equivalent in his phonemic inventory; a near-close /e/ could sound like an /i/ due to the raising effect of adjacent coronals, especially because Coptic did not have as large a front vowel inventory. Therefore, Greek internal development with its process of vowel raising and fronting could have produced many of the nonstandard forms regarding e.g. /e, i/, but it is equally possible this was a result from under-differentiation of foreign phonemes and thus impact of Egyptian phonology. These instances regarding the various nonstandard depictions of /i/ and /e/ are dealt with individually in detail in Section 4.3.3, due to their especially multicausal and sometimes even confusing nature.

One major complication rises from the vowel usage of the unstressed syllables. Many of the nonstandard vowels stand in a Greek unstressed syllable, which has been seen as a product of a change in Greek stress patterns. In previous studies regarding Greek usage in Egypt by e.g. Gignac and Horrocks, it has been thought that this was probably reinforced by the substrate effect of Coptic. The strong word stress has been thought to reduce the quality of the unstressed vowel, which, under the impact of the Coptic phonological system, resulted in a schwa (see subsection 4.3.1 for more details). As much as this phenomenon could be, once again, counted to result from multicausality, from the combined effect of Greek internal phonological development as well as the impact of Coptic phoneme distribution, there are instances where

the same is happening in Greek stressed syllables. The vowel quality is altered, and often seems to follow that of the adjacent consonant, thus acting like the vowels in the unstressed syllables. Often, these co-occur in verb formations leading to uncertainty regarding the particular inflectional form the scribe meant to use. In some cases it will remain unclear whether the scribe used an incorrect vowel from another voice category, for instance, or whether the nonstandard vowel is a result from the phonological impact of Egyptian. To give an example, in OGN I: 103, the nonstandard σημανε <sēmane> was written instead of the standard σημῆναι <sēmēnai>. The editors suggest the passive aorist infinitive σημῆναι <sēmēnai> as the standard form (Pintaudi and Sijpesteijn 1993: 123), which might have been here written using the stem vowel -*a*-. This was, of course, normally used for the formation of active indicative, so the scribe might have simply had another verb formation in his mind. However, it is also possible that the form was produced because of the transfer of Coptic phonological rules on the vowel. These instances are dealt with in the Section 4.3.1.1.

Unfortunately, there is no definitive knowledge of Coptic stress. According to Peust (1999: 273), the stress lay on one of the last two syllables. In most cases, the Greek unstressed syllable could be counted as unstressed also in the Coptic stress system. Even more importantly, most of the Greek stressed syllables in which there is nonstandard variation in the vowel quality could be counted as unstressed in Coptic. Therefore, the possibility of transfer of Coptic stress patterns on the Greek usage has to be taken into account in the analysis. The possibility of Coptic stress system being the operative one for the language users might only be masked by the coincidental match of Greek stress patterns in most of the cases, as both of the languages happened to be stress-timed languages with similar types of syllable structures.

I have compiled a database of the nonstandard variants occurring in OGN I. According to the phonemic analysis, most nonstandard spellings occur adjacent to coronal consonants. As discussed in Chapter 3, coronal consonants tend to cause fronting (and raising)[29] of vowels. In addition to this, also many other variants follow the quality of the adjacent consonant. These variants will be analysed in the subsequent sections.

The realisation of the phonetic phenomena without interpretation in context does not tell us what is going on, however, as the reality behind some of the nonstandard forms is other than the surface level suggests. Greek was undergoing a process of vowel fronting at the time of the material in OGN I. This was probably caused by coronal consonants (Teodorsson 1974: 252; Gignac 1976: 330). Horrocks (2010: 168) speculates this to be connected to a stressless position i.e. difficulty of distinctive articulation, and grammatical factors such as the falling together of aorist and perfect, rather than a phonetic environment. Coronal consonants are the largest consonant group so fronting occurring adjacent to them is also a statistical phenomenon. Behind this is the tendency of consonant quality affecting the quality of the vowels, a phenomenon known to belong to Coptic from the numerous nonstandard spellings of Greek loanwords in Coptic (Girgis 1966: 73).

In addition to this, in some words bilabials are causing the same phenomenon, as are some groupings of vowels, together forming another subgroup 'sonorants', also with a tendency to cause fronting of adjacent vowels. Furthermore, some of the words in which there is apparent retraction of vowel quality on the graphemic level have orthographic or other reasons behind them. For instance, πουρου <pourou> from the standard πυροῦ <pyrou> in OGN I: 42 (& 46) seems to have retracted in quality from the standard writing form, but is in reality a production of underdifferentiation of vowel quality, Egyptian not having /y/; underdifferentiation means that there are two sounds in L2 that are not distinguished in L1, so they are confused and merged to one (Weinreich 1963:18). In the case of the Egyptian speakers using Greek, the Greek /y/ was produced as the closest phonemic equivalent available in Egyptian, /u/.

[29] When discussing the fronting effect of coronal consonants on vowels, vowel raising is included in the discussion as a similar phenomenon as that of fronting (e.g. Flemming 2003).

The nonstandard phonetically motivated graphemic variants of Greek vowel usage are in this analysis devided into three categories because of the different phonetic phenomena and graphemic realisations of these, although there are cases where clear division based on the categories outlined here is difficult. The first group consists of the depiction of the (often word-final) unstressed syllable's vowel, which fluctuates between /a/, /e/ and /o/, most often taking the graphemic variant <e>. This is probably due to Coptic influence, in which the reduced unstressed vowel was customarily marked with <e>, although certainly this could also be seen as fronting of /o/ to /e/ adjacent to coronal consonants. The second group consists of underdifferentiation of foreign phonemic elements, in the clearest case between /u/ and /y/. The third consists of the group that fluctuates between /i/ and /e/, mostly in an unstressed syllable and very often adjacent to a coronal consonant. With a superficial look this group could be completely overlooked and be merely seen as evidence of Greek vowel raising. It is, however, also possible for some of these forms to have, in part, been developed out of the bivalency of Coptic *eta*. I will go into details regarding this phonetic phenomenon in Section 4.3.4.

The nonstandard graphemic depiction of vowel quality in later Coptic is similar to the nonstandard graphemic depiction of what was essentially the phonemic reality for the scribes of Narmouthis, be that based on contemporary Greek pronunciation or impact of Egyptian phonology. Based on the evidence provided by the interchangeable use of voiced and voiceless consonants as well as the errors in inflectional morphology, it seems likely we are dealing with the impact of the scribes' L1, Egyptian. This having been said, obviously it is not possible to completely exclude the fact that the scribes were bilinguals, in which case we are dealing with a L2 version of the target language, a possibly different form of Greek altogether, an Egyptian Greek variety.

Thomason defines this type of target language form, where the L2 speakers of the language carry over features of their L1 to their version of the target language, either failing or refusing to learn especially the linguistically marked features of the foreign language, as TL_2. This concerns language shifting, which was not necessarily the case in Egypt, but the process of the formation of an independent language variety called Egyptian Greek might follow the same pattern. Comparing to the case of Indian English, Thomason states that if the shifting group is not integrated into the original TL speech community, the L2 version of the TL becomes the final version of it (Thomason 2001: 75).

The issue of an Egyptian Greek variety has been preliminary outlined by Horrocks. He lays out features that could be seen as parts of an independent Egyptian variety of Greek. Horrocks states as direct Coptic influence the interchanged usage of voiced and voiceless stops, as well as sibilants; confusion of /o, u/; and interchanged usage of /a, o, e/ especially in unstressed syllables. He also sees the interchanged usage of /ai/ and /a/ and omission of liquids adjacent to occlusives as features of an independent Greek variety of Egypt (Horrocks 2010: 112). It is my opinion, however, based on the multiple errors in Greek grammar in the texts, that Greek was, at best, a second language for the scribes, probably not learned in childhood and most probably learned within school education.

4.3.1 Reduction of unstressed vowels: /a, e, o/

In this section I will present those cases that are related to the graphemic confusion between /a, e, o/. These mostly occur in the Greek unstressed syllable, often word-finally, as in the nonstandard production τελεσεν <telesen> of the standard τέλεσον <teleson> (OGN I: 72). By the time period of the OGN I documents, the stress system of the *koine* Greek used in Egypt had changed from using a primary pitch accent to using a primary stress accent (Horrocks 2010: 167). The often-seen confusion in Greek texts from Egypt between /a, e, o/ has therefore been taken to result from this, albeit possibly strengthened by the substrate effect of Coptic, a stress-language (see Girgis 1966: 73-76 and 81-83 for Greek loanwords; Horrocks 2010: 112 about interchanges of /a, e, o/ in unstressed syllables, and assimilation thereof to Coptic schwa, and about remarks on the reinforcing effect of the strong stress in Coptic on the development on Greek stress system, pp. 169-170). According to this theory, it can be seen that the Greek unstressed syllable's weakening effect on the vowel quality combined with the fact that in Coptic, the unstressed syllable's vowel was reduced, resulting the vowel quality in schwa. By the Egyptian writers this was in OGN I and elsewhere written with one of <a, e, o> (see Gignac (1976) for the general picture of Greek in Egypt as a whole and Leiwo (2010) for a closer analysis of the Eastern Desert Mons Claudianus).

The most common grapheme chosen for the depiction of the schwa was <e> as in OGN I: 115 κερασεν <kerasen> and OGN I: 72 & 73 τελεσεν <telesen> for the standards κέρασον <kerason> and τέλεσον <teleson>, but others occur as well. According to most Egyptologists, this was the most popular way to portray schwa in Coptic (Loprieno 1995: 48; Peust 1999: 250 onward).

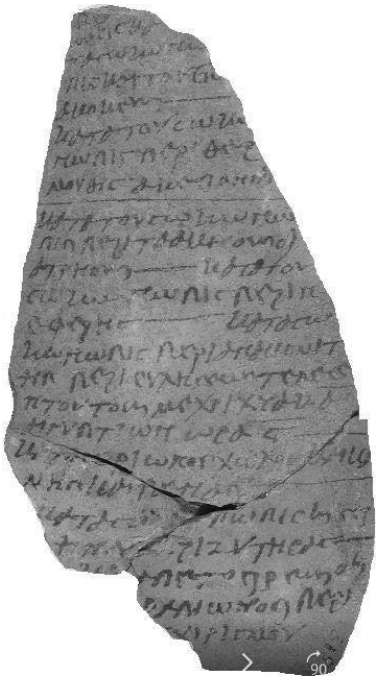
There is some ambiguity to the forms above. *Telesen* from OGN I: 72/73 could be an unaugmented form of ἐτέλεσεν <etelesen> from τελέω <teleō>, 'to fulfil, accomplish, execute', ACT.AOR.IND.3SG., or it could be a schwa-depicting nonstandard form meant to be standardly *teleson*, ACT.AOR.IMP.2SG. The meaning of the text is not entirely clear, it is perhaps orders for the administration of court cases for various crimes. It is from the section dubbed by the editors as 'Promemoria', i.e. preliminary notes that the editors believed would have been rewritten later and the language corrected with better care (Pintaudi & Sijpesteijn 1993: 13). The editors of OGN I take no definite stance in the commentary on which one the intended form is as the aorist forms mentioned above are both suggested. Personally, I think the latter one, 2nd person singular active aorist imperative, suits the context better (see below). The editors have also translated the meaning to match that of an imperative as can be seen from (13) below.

(13) OGN I: 72, Promemoria.

…τελεσεν τούτους μέχρι Χυακ ᾱ Αἰγυπτίων ὥρᾳ ς̄
<telesen toutous mekʰri Kʰyak ā Aigyptiōn ʰōra s̄>…

"Execute these by the 1st of Khoiak [according to the calendar] of the Egyptians, day 6…"[30]

[30] "…Realizza questi entro Choiak 1 degli Egizi, ora 6…" (Pintaudi & Sijpesteijn 1993: 89).



Picture 1. OGN I: 72, The Cairo Egyptian Museum (pictures taken from the originals by Dr. Angiolo Menchetti).

From the context it would appear that the intended form was imperative, and therefore the vowel usage should be standard /o/ instead of /e/; therefore, I believe this is another instance of depicting a word-final schwa according to the Coptic orthographic rules.

Sometimes we see the reverse taking place, as a standard /e/ is written with <o>, as in OGN I: 82 γίτωνος <gitōnos> from the standard γείτονες <geitones>, but often these are examples of case confusion, or a form of hypercorrection – the scribes might have been conscious of the fact that Greek used /o/ in the unstressed syllable, unlike Coptic, so every now and then it was used in Greek words even where it should not be. The above examples all take place in the unstressed syllable and are perfectly in line with the orthographic practices of Coptic for depicting schwa, albeit for Narmouthis perhaps a bit early regarding Coptic literary standards. The phenomenon can be explained with the acoustic schwa being written with one of its nearest graphemic counterparts provided by the Greek alphabet, as /e, o/ are both middle vowels, and even the Coptic /a/ was a central vowel. This understandable practice was probably then later turned into an orthographic convention. Below are some examples from the Narmouthis Greek collection of this phenomenon.

Ostracon	**Nonstandard**	**Standard**
OGN I: 72(73)	τελεσεν <telesen>	τέλεσον <teleson>
OGN I: 79	Αλεξανδριον <Alek^{s}andrion>	Ἀλεξάνδρειαν <Alek^{s}andreian>
OGN I: 82	γιτωνος <gitōnos>	γείτονες <geitones>

OGN I: 87	αλλαχωσι <allak^{h}ōsi>	ηλλαχόσι <ēllak^{h}osi>
OGN I: 92	εξηλαθαν <ek^{s}ēlat^{h}an>	ἐξῆλθον <ek^{s}ēlt^{h}on>
OGN I: 92	εγραψεν <grap^{s}en>	ἔγραψαν <grap^{s}an>
OGN I: 115	κερασεν <kerasen>	κέρασον <kerason>

Table 5. Greek unstressed syllable and fluctuation between /a, e, o/.

All of the examples in Table 5 have two things in common: the nonstandard grapheme occurs in an unstressed syllable and adjacent to a coronal consonant. As mentioned before, coronal consonants tend to cause fronting in the languages of the world. This phenomenon seems to have taken place in all of the words above. *Telesen* has received an /e/ in the final syllable, thus fronting the vowel quality in the middle of /s/ and /n/ from /o/ to /e/. In *Alexandrion*, the vowel quality is retracted from the standard Greek /a/ [a], but in liberal interpretation of the coronal fronting theory this still complies with the rule, being still raised from an open vowel to close-mid. *Gitōnos* is the exception to the rule, while *grap^{s}en* and *kerasen* comply completely with the rule.

Almost all of the nonstandard vowel graphemes in OGN I occur adjacent to coronal consonants. It is therefore a possibility that instead of representing a graphemic depiction of an unstressed reduced vowel, the /e/ in all these forms was an actual phonetic representation of [e], a result from the fronting effect of the adjacent coronals. This, however, is not reflected in the Greek internal phonological development as there is fronting mainly only in the Northern (modern) dialects, but not from /o/ to /e/. Furthermore, it seems a more likely scenario that the grapheme chosen to depict schwa was quite often determined by the effect of the consonants on the vowel quality, as can be seen to happen in Greek loanwords in Coptic (Section 5.1). In other words, in the words in Table 5, it is possible that schwa has been depicted with a front vowel grapheme because of the front consonants' effect on the vowel quality, albeit somewhat neutral due to being unstressed and word-final. Nevertheless, the phonetic quality of the nonstandard vowel was schwa, even if perhaps a bit raised in quality. This has to do with Egyptian being a 'consonant-rich' language.

The consonant-vowel ratio in Coptic was not as remarkable as in Middle Egyptian due to language-internal phonological processes that merged e.g. voiced plosives to voiceless ones and the many laryngeals to each other thus simplifying the consonant inventory, but a distinct acoustic perception of the exact consonant quality was still crucially important because of the word formation principle on the so-called consonant root. The term 'consonant-rich' is used by Maddieson in trying to clarify different ways in which consonants might dominate a language's linguistic system in other ways than only having a larger than average consonant inventory. Such is the case of e.g. the Australian language Diyari, which has a very average amount of consonants, 22, but only three vowel qualities, which results in a high consonant-vowel ratio 7.33 (Maddieson 2013). In the same way, in my opinion, Egyptian should be considered 'consonant-rich' because even though Coptic consonant-vowel ratio is not as high as that of Middle Egyptian, the linguistic system still lies on the importance of consonant in word formation. Coptic, at least according to Loprieno (1995: 40), also still has some very unusual consonants in the phonological system, i.e. ejectives (only found in twenty percent of the world's languages (Ladefoged 2012: 151). Henceforth, the term 'consonant-rich' will be used in this book to generally describe languages that have a consonant-based domination in the linguistic system, phonologically or in terms of morphological coding. The root-and-pattern

morphology of Afroasiatic languages can be classified in the latter group, the word formation being based on a (usually) 3-4 group of consonants.

As discussed in Section 2.3, the same effect is used in the phonological systems of other consonant-rich languages, for instance in North-West Caucasian ones; coarticulatory effects of consonant on vowels can give information on the approaching consonant's exact quality already in the modified value of the preceding vowel. The matter is discussed in more detail regarding the reduction of the word-final Greek vowel due to Egyptian impact in Dahlgren & Leiwo (in prep.).

4.3.1.1 Confusion of /a, e, o/ in phonologically uncertain cases (with possible morphological background)

In the Narmouthis Greek collection, there are 38 instances of a nonstandard vowel occurring in the Greek stressed syllable. What has previously not been taken into account is the possibility of Egyptian stress patterns being a co-factor behind the phenomenon. As the Coptic stress usually lay on one of the last two syllables it is possible that the Coptic unstressed syllable would quite often have been the same as in Greek, as in κέρασον <kerason> and τέλεσον <teleson>. The first syllable in these words is stressed in Greek, leaving the two final ones at the mercy of Coptic phonological and consequent orthographic rules. It is probably because of this that the final unstressed /o/ (likely also according to Coptic stress patterns) has been reduced to schwa and marked with <e>, as was (later) the practice in Coptic, thus becoming κερασεν <kerasen> and τελεσεν <telesen>.

However, there are uncertain cases such as *sēmēnai* written as *sēmane* in OGN I: 103. In this word, it is possible that the reason behind the nonstandard form lies in phonology; Horrocks (2010: 112) has stated the variation between α <a> with αι <ai> and ε <e> as one of the clearer indicators of an Egyptian Greek variety. By this indication, given that the vowel quantity was already lost, /e/ could also have been depicted with η <ē>, implying that the pronunciation of *eta* might have been somewhat lower in Egyptian Greek than in standard Greek, in Egypt sometimes pronounced close to [a]; this is in fact correct, which will be discussed in Section 4.3.4. Following this, it is possible that this particular graphemic form would be a product of a Greek word handled according to the Coptic prosodic rules, i.e. the stress being somewhere else than in Greek, on the first or the last syllable. The unstressed syllable has in that case been made visible with the nonstandard vowel grapheme <a>, actually representing a reduced vowel quality, /ə/.

The Coptic schwa would have in *sēmane* been depicted with <a>, as was also customary for Coptic orthographic practices. However, there is also a third explanation for the nonstandard form. The verb stem has in the present indicative *-ai-* in it, so phonological reasons aside, it is possible the scribe has just produced the form using the incorrect stem vowel /a/, meaning to produce a 3rd person singular active indicative present instead of the passive aorist infinitive.

Ostracon	**Nonstandard**	**Standard**
OGN I: 92	τινος <tinos>	τινάς <tinas>
OGN I: 103	σημανε <sēmane>	σημῆναι <sēmēnai> indicate.PASS.AOR.INF

Table 6. Greek stressed syllable and fluctuation between /a, e, o/.

The structural difference between Egyptian and Greek combined with the strong stress in Coptic could therefore lead to phonetic spellings in which especially the word-final unstressed vowel in a Greek word was marked according to Coptic orthographic conventions as schwa. Consequently, information on Greek morphological status was lost, resulting from the confusion of the vowel quality at the end of the word. Dahlgren and Leiwo (in prep.) offers a broader analysis of the effects of transfer of Egyptian phonological system on Greek verb semantics.

Girgis (1966) has analysed the graphemic vowel fluctuation in Greek loanwords in Coptic. Although there are instances where it takes place in the Greek stressed syllable, numbers rise in the unstressed syllable. According to Girgis (1966: 81-82), the unstressed /o/ in Greek loanwords was marked with /a,u,e,i/, these representing phonemes possible for the Coptic phonological system. It is clear that in this language contact situation phoneme replacement, outlined already by Weinreich (1963: 18-19) as one of the typical phenomena in a language contact situation, was taking place, replaced on the written level by such graphemes that presented phonemes suitable for the word stress position in the recipient language. If the nonstandard vowel is taken to be as proof of that syllable being unstressed according to the Coptic system, taking into account that most Greek unstressed syllables can also be seen to be unstressed in Coptic, the hypothesis of Coptic prosodic rule of the unstressed syllable's vowel being reduced to a schwa can be taken to be the motive behind these nonstandard variants, each grapheme of < a, e, o> possibly depicting the Coptic /ə/ especially word-finally.

4.3.1.2 Confusion of /a, e, o/ in excluded cases (scribal errors)

There are some cases that could technically speaking be within phonological variation, such as παρε <pare> from the standard παρά <para> in OGN I: 114. The vowel is adjacent to /r/, which in Coptic raises vowel quality in some conditions (see Section 4.3.2.4) that could, in fact, be applied here. However, I think it is far more plausible from the context that these are what are normally called 'scribal errors'. The term refers to the technical properties of text composing, in this particular case to the simple error of writing ε <e> instead of α <a> at the end of the word because the writer's mind was already focused on the next word beginning with ε <e>. Having said this, it is of course impossible to say whether nonstandard variants like this one could in some instances be the result of the phonetic level interfering with the writing process or whether they are combined with the other triggering factors such as the following ε <e> here, the two consecutive words being παρε εμου <pare emou> ('from me'), presenting a simple case of elision. Nevertheless, although elision is phonological, I would still categorise this as a technical error because there is an identical case in OGN I: 98 with the word κατά <kata> written as κατε <kate>, from κατε εμου <kate emou> ('by me'), apparently confirming repetition of the vowel grapheme as the factor for variation. However, according to Sebastian Richter, there are also attested spellings <pare> and <mpare> of *para* in Sahidic, Lycopolic and Fayyumic Coptic; in Late Coptic, there is even a form <mpar> while Late Fayyumic has a dialectal <mpal>. This could be linked to the fact that if treated within Coptic phonological rules, a preposition connected with a noun would be unstressed (thus easily creating elision) (Sebastian Richter, p.c.). If this is the case, surely it also applies to <kate>. For the time being, however, this issue remains unresolved.

4.3.2 Under-differentiation of foreign phonemes and allophonic variation: /o, u, y/

This section deals with the phonemic confusion between ο, ου, υ <o, ou, y> /o, u, y/. It is divided under two phenomena, under-differentiation of Greek /y/ as /u/ under the influence of Egyptian phonology, and the confusion between /o, u/, mainly resulting from the impact of Egyptian allophonic variation and phoneme distribution (Gignac 1976: 211-214 and Horrocks 2010: 112), but possibly a product of multicausation, also related to grammatical confusion. In the latter group ο <o> also varies with υ <y>, albeit probably only as a reflection of the /y, u/ under-differentiation; nevertheless, because of this, these two separate phonological phenomena are taken to be analysed within the same chapter.

As will be explained in what follows, /y, u/ variation is somewhat rare in Greek usage in Egypt. Nevertheless, it is a clear result of language contact, the impact of Egyptian phonology, as already stated by Gignac (Gignac 1976: 216). Gignac describes <ou> and <y> being confused 'occasionally', meaning 'often'[31], although he is relying on only 26-100 examples of the phenomenon in his vast corpus of material. Nevertheless, he connects the phenomenon to the impact of Egyptian phonology (Gignac 1976: 50; 214-216). There is less of the phonetically related confusion between /o, y/, which Gignac believes to be partly related to the raising of /o/ adjacent to /s/ (Gignac 1976: 293-294). This is most likely related to the L1-related /y, u/ confusion of Egyptian writers, although some arguments can be made for this to be partly orthographically based, influenced by Coptic orthographic conventions, as could be the case for /y, u/ confusion; *ypsilon* formed the second part of diphthongs in Coptic as well, mainly in relation to Greek loanwords, and this orthographic convention was by some writers mistaken so that <y> alone depicted /u/ although in standard Coptic /u/ was written with <ou> just as it was in Greek.

There are not many examples of either phenomenon in the Narmouthis collection, but they are linked to a larger tendency of use within the same area of Egypt and period of time, and especially the usage of /u/ instead of /y/ is easy to explain in terms of Egyptian impact on Greek. The intermixed usage of these phonemes is not random but dictated by the perception of Greek as a foreign language, probably related to imperfect learning, and used according to Egyptian phonological rules. Interestingly, however, even though the origin of the /y, u/ confusion is in the impact of Egyptian phonology, it also proves that scribes knew Greek well enough to know its pronunciation, unlike what could be deduced from the previous chapter dealing with the unstressed vowel's reduction to schwa following Egyptian phonological rules. The near-phonetic nonstandard writing of /y/ in various ways shows knowledge of the fact that it was a rounded front vowel, and that Greek internal phonological development had lead it to the situation where the diphthong /oi/ and /y/ had the same phonemic realisation.

Even though the /y, u/ confusion might be less common than some other features in Greek in Egypt, it is nevertheless one of the clearest ones. Therefore, it makes it particularly interesting that there is only one secure example of /y/ being confused with /u/ in the Narmouthis Greek ostraca, and that the same word is in use elsewhere in Fayyum, and only Fayyum, within the same period of time. This discrepancy within the usage of /y/ is the reason the word is analysed within the framework of loanword phonology instead of only concentrating on ordinary phonological transfer analysis related to language contact situations. This point of focus offers us a model on how certain types of words might have acquired individual writing forms over generations of advancing societal bilingualism.

[31] Terms and numbers by Gignac (1976: 50).

4.3.2.1 Underdifferentiation of foreign phonemes: /y, u/

The most transparent example of underdifferentiation in the language contact between Greek and Egyptian is the graphemic fluctuation between ου <ou> and υ <y> when depicting Greek /y/. Underdifferentiation of foreign phonemes is one of the most typical phonological phenomena in contact situations. When dealing with loanwords or second language production in general, the L2 user tends to use various strategies in pronouncing phonemes not part of the mother tongue inventory. Some are underdifferentiated, some overdifferentiated due to L1 influence, there is reinterpretation of distinctions i.e. distinguishing L2 phonemes by features that are relevant in L1 but concominant or redundant in L2 and last, sometimes a foreign phone (or phoneme) is replaced by one that is the closest equivalent in the first language repertoire (Weinreich 1963: 18). An example of bringing redundant features to L2 from L1 is German speakers' reinterpretation of English phonemic contrast in e.g. words *beet* [biːt] and *bit* [bɪt]. For German, the more important feature in these words is length, not the tense/lax quality as it is for native speakers of English, who do not, in fact, quite often even hear the quantitative difference. The same allophony occurs in German (*bieten* [biːtən], *bitten* [bɪttən]), but for native German speakers, the length is what matters; the allophonic variation is just a side effect (Major 2001: 32). The same goes for Finnish, in which vowel quantity is phonemic, and transferred to L2 English in a similar manner both in production as well as perception of it.

Another example of L2 language production is Russian speakers' tendency to overdifferentiate when producing the Finnish /y/. Russian does not have /y/, and the Finnish /y/ is by Russian speakers perceived as two successive phonetic features, palatal and then labial, when in fact these are produced simultaneously. Henceforth, Russian speakers of L2 Finnish substitute [y] with [ju], a phoneme sequence available in their language (Wiik 1965: 30); similarly, e.g. Bulgarian borrows Turkish <ö> /ø/ as [jo] in e.g. BalkanSlavic *gjol* from Turkish *göl* 'lake'; an archaic word except for the meaning 'puddle' in Bulgarian (Friedman & Joseph to appear (2019)). Interestingly enough, this goes in reverse in some of the Greek dialects (e.g. parts of Thessaly, Macedonia, and Thrace, see Newton 1972: 46-52 for details) where front rounded *ö* and *ü* develop secondarily from sequences of *io* and *iu* under Turkish influence (Sawicka 1997: 16).

Sound substitution, on the other hand, is equally dependent on the language-internal phonological system but less easily defined as it is not limited to merely replacing foreign phones or phonemes by native language ones, but this is further defined by which features of these phonemes are relevant for the native language. For instance, Spanish learners of L2 English substitute English /θ, ð/ with dental /t, d/ whereas French speakers use /s, z/; on learning French /y/, English speakers use /u/ but Brazilian speakers use /i/ (Major 2001: 31; Weinreich 1953: 20).

From the examples above, it is possible to see that a language adapts foreign phones according to a language-internal linguistic phenomenon. In other words, speakers perceive similarities between the sounds of the two languages they are trying to use, usually deriving from shared features in the place of articulation of these sounds, sometimes also in the manner of articulation. One sound is thus being represented by the other, speakers reinterpreting the loanwords or target language through the phonological system of the recipient or native language. This type of approximation allows the speakers to produce foreign words within a familiar phonological framework (Matras 2009: 226). In the situation with Greek /y/, the Egyptian scribes produced it as /u/, a familiar sound from their own phonological system, and the shared articulatory place in this case was closeness, and the shared manner of articulation was roundedness. In Greek this was a close front rounded vowel, and in Egyptian a close back rounded vowel. In the examples provided by Threatte of earlier Attic inscriptions, there are only a few attestations of this confusion, and these seem to be resulted in phonetic assimilation to

labials in e.g. Σουβρίδης <soubridēs> from Συβρίδης <sybridēs>, or a non-Attic dialectal (Lycian) background (Threatte 1980: 266-267). Joseph (1979: 46-48) writes about a minor change affecting some words in Ancient Greek involving an irregular [u] between labial/velar and a sonorant (/r, l, m, n/), giving weight to the theory of the coarticulatory effect of consonant quality on that of the vowel. In some cases, both surrounding consonants are labial or velar. Examples of this phenomenon are e.g. νύξ <nyk^{s}> 'night', μύλη <mylē> 'mill' and φύλλον <p^{h}yllon> 'leaf'. It seems that the /u/ in many of these types of words is the result of a former /o/ (possibly in some cases /e/) that was raised to /u/ in these phonetic environments, all consonants with an ability to raise vowel quality.[32] In Latin, for instance, the word for 'night' is *nox,* which goes toward proving this theory. What is more interesting, however, is that the same phonetic environments have produced an irregular [u] in the development from Medieval to Modern Greek to a few words in some dialects, this time arising from earlier [i]. These were still in Medieval Greek written with ι <i>, ει <ei>, and η <ē> so there are more sources behind this development than in the one regarding Ancient Greek.While it is possible that [i] was rounded and retracted to [u], according to Joseph it may also be connected to the fact that some dialects of Modern Greek, especially the Northern ones, regularly deleted unstressed [i]; thus, the resulting [u] in these words possibly acted as an epenthetic vowel, displaying the rounded quality affected by the surrounding consonants.

In other words, the consonantal surroundings could have an effect on the vowel quality even Greek internally. Regardless, even if this is a feature present in some irregular developments in Greek, I do not think this should be considered a Greek internal feature in Egypt. It was not a feature in standard Attic, from which Koine was developed, therefore any large scale usage of this feature should not have existed in Egypt. More importantly, Joseph's examples show a phonetic reality behind this type of variation, and it can reasonably be suggested that the phonetic environment could have affected also, or even more so, second language speakers of Greek: /y/ was not part of their L1 phonological system, but the rounding effect of the consonantal environment gave them information on the rounded quality of the vowel, ending in a representation as <ou> /u/.

There is only one proper instance of the /y, u/ confusion in OGN I, but a significant one. This is the nonstandard writing form πουρου <pourou> for πυροῦ <pyrou>, the genitive form of 'wheat', a common commodity used for paying taxes. The explanation behind the usage is very simple, however, regardless of the relative rarity of the usage compared with e.g. the nonstandard depiction of /a, e, o/: the Egyptian tendency to underdifferentiate between /y/ and /u/.

[32] Proto-Indo-European had a labialised velar /k^{w}/.

Picture 2. OGN I: 72, The Cairo Egyptian Museum (pictures taken from the originals by Dr. Angiolo Menchetti).

The distinction in the phonemic quality may not have been clear for the Egyptian writer especially if he was writing from dictation, as we presume (see Section 1.4.2.1 on dictation). Furthermore, in the case of dictation, we must also take into account the possible L2 pronunciation of the person dictating; for the two close rounded vowels in Greek, /y/ and /u/, Coptic only had the back vowel, /u/, which was probably also a factor regarding L2 pronunciation of Greek, so the scribe's language production in the case of dictation and lack of firm knowledge of Greek standard orthography must have been affected by the phonemic outcome of the person delivering the contents of the message in oral form.

Irrespective of the hypothetical reasons, the Greek υ /y/ was often depicted with ου <ou> [u], a close rounded vowel available in the Coptic phonological system. An example of this is presented in OGN I: 42 and 47 (twice) where the Greek standard *pyrou* has been written as *pourou*. Interestingly, the same *pyrou* has been written ποιροῦ <poirou> in OGN I: 46 and 86 (see analysis in Section 4.3.2.2).

It could be hypothesised that this is an Egyptian variant for the tax term in the same way the financial term ϩⲟⲗⲟⲕⲟⲧⲧⲓⲛⲟⲥ <holokottinos> from Greek ὁλοκόττινος <holokottinos> clearly is in Coptic documentary texts, replacing the standard Latin based term (*nomisma*) *solidus* used in Greek for the same monetary unit (gold coin) in similar documents. *Holokottinos* is also subject to abundant variation (see Förster 2002: 569-574 for a six-page list of variants),

so much so that it is in some variants completely integrated to Coptic phonology. The Bohairic version, under which Crum lists the dictionary entry of the word, is ⲗⲟⲩⲕⲟϫⲓ <loukodϫi>, although even this is only one of many variants; the standard Sahidic is given as ϩⲟⲗⲟⲕⲟⲧⲧⲓⲛⲟⲥ <holokottinos> (Crum 1939: 140b).

Nevertheless, even if *pyrou* had received independent Egyptian variants, it can hardly be argued that the form is not in Coptic phonological form from the standard Greek original orthography. Furthermore, this is not an idiosyncratic form produced by one writer. First of all, the three texts in which this form occurs in OGN I are not produced by the same scribe. Second, the nonstandard form *pourou* occurs in some other Greek texts as well, mostly from the Fayyum area (details of these in Section 5.3). Regardless of these few other instances of the word usage, it is probably safe to say that *pourou* was not a standard form in tax measures vocabulary, although it seems to have developed to a semi-standard local variant. A similar example is found with another word related to administrative language. The word γείτονες <geitones> 'neighbour (pl.)', briefly dealt with for its nonstandard orthography in previous chapter, is often depicted as γιτωνος <gitōnos>, and also mostly in the Fayyum area, and within the same period of time as *pourou*. As with *pourou*, there is graphemic variation of a few forms, but still the nonstandard form *gitōnos* is used often enough for it to be considered some sort of standard for some writers in the Fayyum area (also *gitōnos* will be dealt with in more detail in Section 5.3).

Horrocks writes about sound changes being first reflected in the most frequent words, personal pronouns (Horrocks 2010: 118). He writes about this in relation to /y/ being already raised to /i/ in the language of some writers, although this could just as easily be a reflection of underdifferentiation between /u/ and /y/ in the texts written by Egyptian writers; for instance, estimated by Gignac as a non-Egyptian (Gignac 1976: 48), the writer of the letters 110-120 in *P.Fay*., a person called Lucius Bellienus Gemellus, whose name is of Umbrian origin, has no instances of /y, u/ confusion. The language use of Gemellus has recently been analysed by Leiwo (forthc.), and although there are nonstandard features in it in the form of depiction of word-final schwa with ε <e> (see Leiwo: forthc. as well as Dahlgren and Leiwo in prep. for further analysis), Leiwo is convinced Gemellus does not display the typical idiosyncracies of an L1 Egyptian writer.

Gemellus might not be a native Greek writer, but he knows Greek reasonably well, and the name suggests an Italian origin. Gemellus might, of course, have switched to Egyptian and learned Greek as a foreign language, and been writing it as a matter of course, it being the *lingua franca* of the time, and due to the difficulty of the Egyptian writing system of the time, Demotic. Or Gemellus might have learned a local variety of Greek in the army as he was a veteran, suggesting some sort of Koine, an Egyptian Greek variety being spoken as a general means to understanding one another in the army. Nevertheless, the confusion between /u/ and /y/ seems to be limited to Egyptian writers, and surfacing in the form of some very frequently used words such as personal pronouns. With personal pronouns, of course, it is impossible to say whether the confusion lay on the phonological level or in grammatical confusion.[33] Egyptian did not have cases, so confusing Greek case endings was very frequent. But I suggest that administrative vocabulary may be regarded just as frequent, being the bread and butter of most temple scribes. Often repeated words such as *pyrou* would probably start to live lives of their own, getting more and more integrated into the native language phonology of the writers. The nonstandard form of *geitones*, *gitōnos,* with its many different writing forms further serves as a parallel example of this phenomenon, alongside the Coptic *holokottinos*. Even though *pyrou* was apparently never borrowed into Coptic (it is not listed in Förster 2002), it can perhaps be dealt with as an equivalent to loanwords in the sense that it is categorically within the first

[33]See Stolk (2015) on this in Section 4.3.2.4.

group of words to be borrowed (Thomason 2001: 69), a technical term, and repeated often. Therefore, its usage can be analysed according to the understanding of loan phonology.

	Standard	**Nonstandard**	**Nonstandard**
Form	πυροῦ <pyrou>	ποιρου <poirou>	πουρου <pourou>
Number	0	3	3
Ostracon	-	OGN I: 46, 86, 93	OGN I: 42, 47 (2)

Table 7. Depictions of <pyrou> in OGN I.

Confusing /y/ with /u/ was not the most common of nonstandard spellings, albeit a clear indication of the impact of Egyptian phonology. Judging by the amounts of nonstandard attestations, confusing Greek /y/ with other front vowels is much more common than confusing it with /u/. Gignac analysed 32 284 documents for his study of phonological variants, in this number including many of the documentary papyri and ostraca from the beginning of the Roman period (30 BCE) until 735 CE (Gignac 1976: 1); the Eastern Desert documents are missing from this number, having been found after Gignac's time.

Gignac gives 17 individual words for examples of ι <i> instead of υ <y> but many more follow in lists of specific words and their combined variant spellings, such as βύβλος <byblos> 'book' in various forms, out of which βιβλος <biblos> is one; he gives only 9 examples of /u/ instead of /y/ (but both nonstandard spellings go in both directions) (Gignac 1976: 215, 267-268). However, it seems evident that in the case of Greek /y/ at the time of this study, the more relevant distinction for perception for a native speaker lay rather on the roundedness than on the closeness of the phoneme, to be able to distinguish between the two close front vowels in the native language, a smaller difference than i.e. between /i/ and /e/, and only distinguished by the effect of rounding (or lack of it). Not having /y/ in the L1 vowel inventory, it is understandable if a native speaker of Egyptian had difficulties in separating /y/ from other front vowels available in the L1 vowel inventory, i.e. /i/ and /e, ε/, especially with the reduction of unstressed syllables, which would in that position weaken the acoustic distinction between close front vowels even in the native language.

The answer to this variant in OGN I might lie in bilingualism. Fayyum was a bilingual area, as stated in Chapter 2, and more so than most other regions in Egypt. The amount of Greek population and native speakers was probably the largest in Egypt, Fayyum having been the area into which soldiers were first assigned during the migration movements of Greek people already in Ptolemaic times. As the corpus found in the Narmouthis temple itself is bilingual, there are grounds to suggest at least some level of Greek knowledge for the scribes alongside Egyptian; it was probably a language they were accustomed to hearing in the neighbourhood. Maybe, then, the correlation between Fayyum bilingualism and the /y, u/ confusion is a phenomenon related to inadequate learning, in a linguistic situation of preliminary societal bilingualism.

Haugen, one of the first contact linguists and scholars of loan phonology and still widely cited in relation to loan phonology, agrees to the generally held opinion that a time scale of borrowing can be deduced from the form of the loanword: early loans, the forms of which are produced by monolinguals or language speakers with elementary bilingualism[34], are more distorted than the late ones, which resemble their models more adequately. However, Haugen

[34] Haugen uses the term 'bilingual' in the broad sense of including monolingual speakers with second language knowledge.

made some reservations on this: timing cannot be known for all loanwords, as not all of them include critical sounds that would be replaced by native language phones.

On the other hand, Haugen sees that the difference between the distorted or more faithfully depicted forms is more related to the degree of bilingualism, not the time of the borrowing, as bilingualism may come suddenly or over a period of many generations, and therefore loanwords may enter a language through various members of the community, in several forms. He does point out, however, that in e.g. Native American communities, where English loanwords have several forms with varying degrees of phonemic substitution, some of the phonemic substitutions are so widespread that they are likely to represent early borrowings. Haugen further points out that with increasing knowledge of the donor language's phonology, bilinguals (i.e. second language speakers) can later adapt the loanwords' orthography to be more compatible with the phonological system of the donor language. What is more important is that while it is impossible to know the exact process of words being borrowed, certain things can, according to Haugen, be assumed about the logic behind this process.

One is that a bilingual (the term used of any people who know the second language in any degree) tries to introduce a new loanword in as accurate a phonetic representation of its original form as possible (see also Matras 2009: 223 on this). On the other hand, being repeated by him/her or other speakers of the language community, the loanword is likely to undergo replacement of native language elements, especially when later complete monolinguals learn it, in which case even total substitution will often take place. Native language phonemic substitution can at times be so absolute that the outcome is unrecognisable to a speaker of the loanword donor language, as in the case of Taos Indians' production of Spanish *virgen* as [m'ilxiną], where too many of the loanword's original phonemes have been replaced with native ones for the reproduction to still be understandable to the donor language's speakers. (Haugen 1950: 215-217). According to Matras, however, especially in situations where the donor language has prestige, even the monolinguals will remain so phonetically accurate on repetition of borrowed material that new phonemes will be introduced to the recipient language in the relevant loanwords (Matras 2009: 223).

While the phonetic accuracy described above might hold true for some of the speakers in any given contact situation, I am inclined to think that the majority's linguistic skills in any situation will not be sufficient for a very faithful repetition of foreign phonemes, and in most cases the loanword will be integrated to L1 phonology to some degree. Although Greek is generally understood to have been a prestige language in Egypt, the situation with Narmouthis scribes' Greek usage resembles more Matras's description of system convergence, a situation where speakers do not maintain two separated systems of phonological sub-components but instead use one phonemic inventory, including rules on phonemic distribution (see /a, e, o/ variation in Section 4.3.1 and /o, u/ variation in 4.3.2.3), to communicate with both languages. This might happen because the second language speakers are reluctant or unable to fully acquire the phonological system of the TL, and a situation like this can lead to a group-particular accent, in which pronunciation follows the phonological rules of L1. According to Matras, this mostly happens with more intense bilingualism, and following Matras's four-way typology on the intensity of language contact, Greek-Egyptian contact can be seen to match both Type A and C. Type C stands for phonological adaptation of word forms, or convergence of systems during second language acquisition, words of TL systematically adjusted to match L1 sound patterns, emerging bilingualism with stable minority bilingualism, strong group identity with a need to acquire the target language. (Matras 2009: 223-226). This seems to hold true for the perhaps semi-bilingual scribes of Narmouthis, whose language skills may lie between types A and C, semi-bilingual/monolingual speakers (A) to emerging bilingualism (C).

Type	Process	Description	Speakers/ Bilingualism	Language attitudes
A	Phonological adaptation of word-forms	Replicated word-forms are adjusted to match the sound patterns of the recipient language	Semi-bilinguals or monolinguals	Strong loyalty towards, and stability of the recipient language; superficial contact
B	Borrowing of phonological features along with word-forms	Borrowed and inserted word-forms maintain (fully or partly) the original sound patterns of the donor language ('authentication')	Fairly widespread bilingualism	Flexibility in the use of the recipient language, prestigious bilingualism
C	Convergence of systems during second-language acquisition	Word-forms of the target language are systematically adjusted to match the sound patterns of the native language	Emerging bilingualism; stable minority bilingualism; emergence of ethnolect or language shift	Strong group identity coupled with a need (pressure) to acquire the target language
D	Convergence of systems in stable, intensive bilingualism	Sound patterns of the native language are adjusted to match those of the second language	Intensive and widespread bilingualism	Second language is 'prestige' language

Table 8. Matras's four-way typology, Greek-Egyptian contact at Type C.

Given that Greek language competence meant work, there probably was some pressure and desire for especially scribes to learn it. Emerging bilingualism seems a fact when analysing the phonemic fluctuation, as does native language phonemic integration. Words cannot be said to have been systematically adjusted to L1 phonology, but there certainly was a substantial amount of it going on. All of this could be seen as being indicative of an emerging (local) Egyptian Greek variety (an ethnolect is one of the outcomes mentioned in Type C). Matras's typology is a description of emerging societal bilingualism, and is quite well in line with Thomason's level two in her borrowing scale (2001: 70-71): 'Slightly more intense contact, including light lexical and minor structural borrowing, borrowers being a minority group but reasonably fluent bilinguals". This matter of contact-induced change on both languages will be further discussed in Chapter 5.

The Greek word *pyrou* in question here is admittedly not a loanword but follows the same logic in the nonstandard production of it, based on the model of the Egyptian phonological system. Due to its recurrent use in the administrative documents because of its connection to

taxation, it might have been one of the earliest Greek words known in the scribal linguistic communities, and undeniably is within the group of vocabulary that is among the first borrowed in a language contact situation, the so-called non-basic vocabulary (Thomason 2001: 69), often consisting of e.g. technical and administrative terms. *Pyrou* was by the scribes repeated probably as often as any loanwords, and it is therefore possible that it soon acquired a L2 phonological form.

Haugen describes a 'pre-bilingual period', which fits the treatment of *pyrou*. During this period, the loans are taken up by a small group of bilingual speakers and spread into the use of monolingual speakers. They show extensive phoneme substitution, and irregularity on the phonetic level, the latter causing fluctuation in realisation of the phonemes. Haugen calls this *erratic substitution*. Haugen characterises the formation of societal bilingualism, and the next step is *adult bilingualism*, in which the knowledge of the foreign phonemes is growing, thus leading to a more systematic substitution of them, including using familiar sounds used in new positions not found in the native tongue, called by Haugen *phonemic redistribution* (see also Section 4.3.2.3 for the distribution of unstressed /o/ in Greek and Section 5.1 for the same in Greek loanwords in Coptic). Adult bilingualism is quite naturally followed by *childhood bilingualism*, in which foreign phonemes are used without problems by sufficiently bilingual speakers. A good example of *phonemic importation*, one of the characteristic processes of childhood bilingualism, is the phonetic form [fonografo] for 'phonograph' by English-Yaqui bilingual speakers, compared with a loanword borrowed by first-generation bilingual Yaqui, [ehtúpa] for Spanish *estufa,* 'stove', in which the non-native /f/ is still replaced with /p/. (Haugen 1950: 216-217).

Naturally, all of the above could easily be explained in terms of SLA phonology; under-differentiation of foreign phonemes is one of its key components. *Pyrou* is dealt within the theroretical framework of loanword phonology because it is one of the few examples of /y, u/ confusion in the whole corpus, including the nonstandard orthography of a couple of names. /y/ does not seem to be a problem of a general sort for the scribes of Narmouthis, in e.g. words such as 'ϊμισυνθης <imisynthēs> from the standard ἡμισυνθέσεις <himisyntheseis>, which, additionally, has other kind of phonemic variation. Moreover, as the form *pourou* is found in use in other contemporary documents from the Fayyum area, it seems to belong to a separate category of phonemic forms having more erosion or native language phonemic substitution than regular words, similarly to others of the same type, for example *gitōnos*. Following Haugen's theory, *pourou* might have frozen for a while into the phonetic form it was taken in by the first generation of Egyptian scribes (in Haugen's theory the pre-bilingual period), probably mostly monolingual Egyptians trained to use Greek as a foreign language.

Later, at the time of the OGN I corpus's scribes, the word was under process of being remodelled by scribes with better Greek skills to better reflect the phonetic reality behind it, creating fluctuation in the graphemic form between <ou>, <y> and <oi> (see next chapter for the quality of /y/ in the time of OGN I). It could, of course, be argued that the scribes produced these varying graphemic alterations purely based on the fact that they knew /u/ was sometimes written <y> in Greek, but I find this implausible because of the parallel use of οι <oi> to depict the phoneme /y/, which should be taken as proof that the scribes knew features of the Greek phonetic reality, such as that οι <oi> and υ <y> were both pronounced in the same way ([y]). Henceforth, the Narmouthian scribes could be understood to be included in the category of *adult bilinguals*, with increasing knowledge of the Greek phonological system. As can be seen from this description, loanword phonology is applicable to the analysis of *pourou* and *gitōnos* because of the similarity of these words to loanword usage. Loanword phonology as a theoretical framework also provides us with an overview of the linguistic situation under examination over several generations, whereas SLA phonological studies mostly focus on synchronic language situations on a more individual language user's level.

Fayyum was a place of early societal bilingualism, so Haugen's theory on loanwords' phonological integration and varied forms of these over generations of second language Greek users fits the picture, if the degree of bilingualism is taken to be the relevant factor to explain the nonstandard language use. The fact that the earliest examples of fluent bilingualism can probably also be assigned to Fayyum also explains the near-standard usage of the nonstandard form *pourou* almost completely restricted to this area, within the same time period. However, the synchronic quality of υ <y> is also a relevant factor. The time period of the OGN I collection, 1st to 3rd centuries CE, is early for the quality of υ <y> to have changed to an unrounded vowel (Horrocks 2010: 167-169). This might be the reason the form is mostly found only in Fayyum, and mostly during the first few centuries CE. Scribes of later generations produced *pyrou* in the correct Greek orthographic form either because they knew Greek pronunciation better, or because υ <y> no longer resembled /u/ due to having lost its roundedness. This would explain why υ <y> is more often confused with η <ē> and ι <i>, its nearest unrounded phonemic counterparts. Also in later Coptic Greek loanword usage, it seems that some of the Egyptian writers associated Greek /y/ with a close to open-mid unrounded front/near-front vowels such as /i, (ɪ), e, (ɛ)/, going as far as depicting a (in their mind) very much retracted /i/ with <a>, while other writers associated Greek /y/ with a close rounded variant, picking the only Coptic variant possible for this, ου <ou>. In other words, two routes are possible for the underdifferentiated depiction of Greek /y/, either choosing to emphasise close frontness or close roundedness, the latter disregarding the additional frontness of the original phoneme. The relevant question here is: what drove these different L2 users of Greek to use different strategies to represent this foreign phoneme? Below is a description of a study on how languages choose between /u/ and /i/ to represent foreign language /y/.

Phonological Detail: The replacement of L2 /y/ on language-specific preferences

The phonemic substitutive quality given to /y/ by languages that do not have it in their phonemic inventory depends on language-internal phonological systems. Some languages recode it as a close rounded back vowel, some as a close unrounded front vowel. This, and the overall tendency of phonological transfer of the L1 phonological system onto that of L2 is also well attested in a study of perceptual identification and phonetic analysis of six foreign accents in French. The test was performed by L1 speakers of (Maghrebian) Arabic, English, German, Italian, Portuguese and Spanish while native speakers of French tried to estimate the nationalities of the speakers based on their individual interpretations of French phonological features. Naturally, as only German of these languages has /y/, among others features of French phonology, various depictions of the French /y/ were recorded and measured. An interesting division emerged: while Arabic speakers produced the French /y/ close to [i], Italian and Spanish speakers tended to produce it nearer to [u]; i.e., the Arabic speakers favour the feature [-rounded] and the Italian and Spanish speakers favour the feature [+front]. Arabic, Italian and Spanish do not have /y/ in their phonological inventory, and the pronunciation of /y/ was, in fact, one of the strongest features by which native speakers could evaluate the speakers' L1, with an overall accuracy of 52 percent in the whole study, a result ten percent higher than in a similar study of six regional accents of French. It might be noteworthy to mention that for the Arabic speakers, also French /e/ was leaning toward /i/, and that English /y/ is, according to this study, pronounced

> only slightly off the mark to the French one (Vieru-Dimulescu and de Mareüil 2006: 441, 443-444).

As can be seen from that above, languages choose /u/ or /i/ to represent L2 /y/ according to the language-internal phonological systems' properties. Arabic dialects have differing vowel inventories, but in Modern Standard Arabic only three vowels are distinguished: /i, u, a/, and dialectal/colloquial /o, e/ are mostly allophones of these. Interestingly, the Maghrib Bedouin dialects possess a very limiting phenomenon, i.e. /i/ and /u/ have collapsed to schwa, leaving practically no distinction of the phonemes. This leaves the vowel inventory of that particular dialect very poor with only /a/, an unrounded front vowel, and a schwa for auditory distinction (Watson 2002: xIi).

The Arabs performing in the above study were from this region, so this could explain the choosing of /i/ to depict /u/: they had no experience of rounded vowels. The situation in this is that there is a larger front vowel inventory in French than in Arabic, and all front vowels are merged with these speakers to /i/. This is largely the same as in Coptic-Egyptian: Greek had a larger inventory of front vowels than did Coptic, and therefore it would seem logical these to be confused with each other. However, Coptic had /i/, /e/ and /ɛ/, so more clear distinctions could be made on front vowels than for the aforementioned Arab speakers of French. Perhaps this is the reason the back vowel /u/ came to depict Greek /y/, to separate it from the other front vowels.

Through their own language, the Egyptians could perceive a difference between /i, e, ɛ/, and could detect the roundedness in /y/. To avoid perceptual confusion with the other front vowels, /u/ is the only underdifferentiated substitution available for /y/. This also applies to Italian and Spanish, who use a rounded close vowel, /u/, for the depiction of /y/. Both languages already have a rich front vowel inventory, so the speakers of these languages are quite attuned to hearing the distinction of a few unrounded close to close-mid front vowels. Henceforth, the auditory perception of something close but rounded, not part of this category, is probably quite easy. The English speakers' production of /y/ only slightly off the mark (but toward /u/) from the French one can similarly be explained through the impact of L1 phonology. English, like Italian and Spanish, has several front vowels, so to use these for the depiction of French /y/ would overcrowd the front vowel inventory. On the other hand, English has something similar to French /y/, a sequence of /ju/ as in *cue*, so repetition closer to /y/ than /u/ is easier for English speakers than for the Italian or Spanish, through familiarity within their own phonemic inventory. Finally, German speakers manage to produce /y/ very close to the French model, once again through familiarity, German having /y/ in its front vowel inventory. In Weinreich's famous study of the language contact between Romancsh and Schwyzertütsch, the Romancsh failed to pronounce Schwyzertütsch's /y/, producing an underdifferentiation in /i/ (Weinreich 1953: 16-18).

According to Weinreich, languages choose those phonemic substitutions that support the native language's functional load of phonemic oppositions. The native speakers of Schwyzertütsch, for instance, can learn Romansch /i/ and /ɪ/ although there is no such phonemic opposition in Schwyzertütsch because of the functional load of these phonemes for meaning in Romansch: many common words are distinguished by this phonemic difference, e.g. such regularly used words as /ci/ 'who' and /cɪ/ 'what'. The fact that these occur in syntactically identical positions makes it crucial that these are not confused, unlike many other words that could be identified from context: underdifferentiation, therefore, does not occur with this phonemic minimal pair. On the other hand, the contrast between Schwyzertütsch /y/ and /i/ is less relevant, and is not even present in all the Schwyzertütsch varietities (Weinreich 1953: 23).

Therefore, the possibility of confusing /y/ with /i/ is less dramatic than it probably would

be to confuse it with /u/, which probably has more relevant minimal pairs with /y/. This does not, however, totally explain why in the above study the French /y/ was substituted with two different phonemes by different native language users (although language-internal phoneme inventories seem to give some clues to this), but is does give us a possible reason to why the Egyptians might have chosen /u/ over /i/. Given that these language users lived in a bilingual area, they were accustomed to hearing Greek – with no experience of the phonetic level, /y/ could not have been substituted with anything, much less a quite well fitting phoneme with similar features.

Nevertheless, it must also be the case that Greek /y/ had more relevant minimal pairs between the unrounded close front vowel series than it did between /y/ and /u/. When looking at the personal pronouns of Greek, a picture of relevant misunderstandings emerges. These are certainly often-cited words, and confusing /y/ and /u/ here will lead to case confusion even while referring to the same person (e.g. μου <mou> 'I (SG.GEN)' vs. μοι <moi> 'I (SG.DAT), συ <sy> 'you (SG.NOM) or σου <sou> 'you (SG.GEN) vs. σοι <soi> 'you (SG.DAT)). Still, confusing /y/ with /e/, persons are confused: ὑμεῖς <ymeis> 'you (NOM.PL)' vs. ἡμεῖς <ēmeis> 'we (NOM.PL)'. Of course, the general obsolescence of the dative in Koine adds to the issue.

In Modern Greek, after the raising of /y/ and /e:/ to /i/, precisely the first and second plural personal pronouns are the more changed in form, through analogy from the single series, but also to ease distinguishing them from each other (Horrocks 2010: 186). The first person plural is still close to its original form as εμείς <emeis> but the second person plural is εσείς <eseis>, formed from εσύ <esy>, the second person singular (nom.) personal pronoun, so as to create a maximally distinct form from the ancient form ὑμεῖς <ymeis>.

Clearly, languages use different strategies in coping with foreign phonemes, and as it seems in the case of underdifferentiation, sometimes the motive lies in the bilingual's understanding of the L2 phonological system and its most relevant features; sometimes, however, it must originate from the native language's phonological system's requirements. In this case, there is a very clear motive not to confuse /y/ with /i/ or other unrounded front vowels, in order not to confuse such personal pronouns as *ymeis* and *ēmeis*. Whether this was the reason for these scribes, through bilingualism, to turn this way or whether there was a more pressing need not to overcrowd the front vowel inventory from the point of their L1, Egyptian, will for the sake of this study remain open for later investigation. To be sure, in relation to these modern languages depicting a foreign /y/ either as /u/ or /i/, the acute problem with Egyptian scribes is that both alternatives can be found; this, however, might only be a question of timing. In the papyri of later times, more and more /i/ for /y/ is found, probably because of the loss of rounding in Greek /y/.

All found examples of /y, u/ confusion are from Fayyum and from the early Roman period, for words such as personal pronouns μυ <my> and μοι <moi> vs. μου <mou> etc. There are, however, no instances of πυροῦ <pyrou> ever been written with ι <i> or η <ē>. The vast majority of the word is in the standard form πυροῦ <pyrou>. The reason for this is probably simple: increased bilingualism or increased skills of normative Greek and its orthographic rules, due to better education or other factors, might alone have taken care of the spelling of *pyrou* to mostly appear in its standard form. First, it was an often-seen word, and remembering it by heart would have been easy; second, the first bilingual or pre-bilingual generation's TL_2 version of Greek /y/ as /u/ could have been replaced by a more accurate perception of the phoneme, thus decreasing spelling fluctuation. Therefore, for the Egyptian language, /u/ might have been phonemically a better adaptation for the Greek /y/ than /i/ would have been, for language-internal reasons in order to better distinguish between some important minimal pairs, for example. It is, however, beyond the limits of this study to investigate this any further. Furthermore, for this study it bears little relevance as it seems clear that even if for the monolingual Egyptian /u/ was the better fit for Greek /y/, Greek /y/ itself was undergoing

change in quality, and following this, the depiction later changed with time to a yet more faithful production of the phoneme, nonstandardly more and more often depicted with one of the unrounded front vowels.

To conclude: there are two ways to interpret the situation in which some of the Greek /y/ production was conducted as /u/ and some as /i/ (or other front unrounded vowels). Either the Fayyum early bilinguals were more attuned to Greek phonology as the earliest fluent bilinguals and therefore managed to follow the Greek phoneme more faithfully, i.e. as rounded. The Narmouthis Greek collection is full of features stemming from the effect of the scribes' L1, Egyptian, consistent with the above mentioned fluctuation between native language affected pronunciation of foreign phonemes, and the gradual improvement in learning the second language phonology (or at the very least the consciousness of the existent foreign phonemes, at least on the graphemic level), perhaps per generation more than on the individual level of the scribes. Voiced and voiceless stops and sibilants are confused with one another, vowel orthography is irregular, and the phonological confusion is backed up by matching uncertainty in e.g. case inflection, a grammatical feature not part of the Egyptian language (see e.g. OGN I 1-19, and an analyses of these in Leiwo 2003: 5-8).

However, the nonstandard spellings of Greek words also describe an idea of the phonetic level of Greek, which would not be possible without some level of bilingualism. This theory, however, supposes that bilingualism after this deteriorated, and the later generations were more or less monolingual Egyptians with lesser Greek skills, which is not likely. The more logical explanation is that later generations produced Greek /y/ as unrounded because Greek internal phonological development had led to the point where rounding was diminishing or gone. Logically, it does not seem very likely that societal bilingualism in Egypt would have been decreasing in the following centuries after the Narmouthis ostraca as Greek loanwords in Coptic kept on increasing in number all that time, and more and more structural material was borrowed from Greek to Coptic. Therefore, I take to follow the first theory of Narmouthis scribes representing one of the first at all fluent generations of Greek-Egyptian bilinguals, and partially still using the linguistic products developed by the pre-bilingual generation(s). While there is much /i, e, ε/ variation, and in the later texts all of the above and /y/, it is nevertheless only fluctuation between closely pronounced front vowels, in the continuum /i~e~ε/. The tendency to produce Greek /y/ both as /u/ and /i/, on the other hand, requires an explanation, as fluctuation between a front and a back vowel seems less expected. Gignac remarks that when Greek was first brought to Egypt, it was taken in as the Attic variety, in which the ancient /u/, still at the time present in some dialects, had already been fronted to /y/ (Gignac 1976: 216, 266-267). There seems little reason to doubt this, as surely there would be no confusion of these two to reflect the Greek phonetic reality otherwise, as there is of the /i, e/ confusion due to these vowels merging? Coptic had /u/ so producing it would not have presented a problem for Egyptian writers. I have tried to present a solution to this problem, based partly on the level of societal bilingualism and its emergence, and partly on diachronic Greek phonological variation.

There are some instances of the /y, u/ confusion in some of the names. Names, however, did not carry the same level of standardisation and often a few co-existing variants of Egyptian names in Greek alphabet were found. Therefore, they cannot be used as evidence parallel to other nonstandard depictions of vocabulary as often, no one specific orthographic standard can be pinpointed; on the other hand, precisely because of their imprecise nature, certain assumptions can be made about the quality of the phonemes the nonstandard graphemes were trying to capture, but this aspect is better suited for names discussed in Section 4.3.2.4

Besides names, there is one other instance in the vocabulary of the /y, u/ confusion, an interesting counterexample in OGN I: 6, the standard πτωχούς <ptōk^{h}ous> being written as

πτοχυ <ptok^{h}y>. The word is only found in this one instance, in the Narmouthis Greek corpus.[35] This could be a result of hypercorrections, when the Egyptian writer knew that sometimes, what sounded like /u/ in a Greek word, it was written with the grapheme /y/. Or it could be handled in the same way as pourou; it is also an administrative word, meaning *hierodouloi*, 'temple slaves'.

[35] Search run in the Papyrological Navigator (PN) 24th June 2015.

4.3.2.2 Phonemic quality of <y>

In addition to πουρου <pourou>, πυροῦ <pyrou> has also been written as ποιρου <poirou> in three texts in OGN I: in 46, 86 and 93. This is less surprising than the usage of ου <ou> to depict the standard Greek /y/ because /oi/ and /y/ seem to have merged at this time. What has remained a bit uncertain is the exact dating of this phonological process. Horrocks (2010: 167) gives an estimate of οι <oi> /ø/ to have become /y/ by the middle of the 1st century BCE, which is quite a bit earlier than the time period under focus in this study. Already on the basis of ποιρου <poirou>, I would suggest the quality of οι <oi> and υ <y> at this time to have been /y/.

It seems unlikely for this graphemic choice to have been made to depict /y/ unless the idea behind it was to represent a close rounded vowel, given the fluctuation between ου <ou>, οι <oi> and υ <y> for the standard /y/ in πυροῦ <pyrou>. If υ <y> and οι <oi> had at this time represented the phoneme /ø/, it seems unlikely they would have been cross-depicted with ου <ou> for /u/, a close vowel. Had the phonemic quality of υ <y> at this time been /ø/ (a close-mid near-front vowel), one would expect another close-mid or near-close vowel available in the Coptic inventory, for instance the phonemically nearest /e/ (as in Weinreich's study of the Romansch under-differentiation of the Schwyzertütsch /y/ as /i/ and /ø/ as /e/ (Weinreich 1953: 16)), or if choosing a rounded phoneme, perhaps /o/, for the nonstandard depiction. Using the close rounded vowel /u/, even though it is a back vowel, indicates a close rounded quality associated with υ <y>. In as much as names can be used for evidence for phonology, given their nature of lesser standardisation from that of regular lexicon, there are two examples of /y/ being depicted with ου <ou> in OGN I, the term for temple slave, πτοχυ <ptokʰy> for the standard πτωχούς <ptōkʰous>, and the personal name Παχυς <pakʰys> for the standard Παχους <Pakʰous>.

The graphemic confusion between η <ē> and υ <y> has generally been taken as evidence for *iotacism* i.e. the raising of many of the front vowels to /i/, as is the situation in Modern Greek. This has been done in connection with assuming the phenomenon to be the result of Greek internal phonological development, but Gignac who knew Coptic phonology, took it to represent the effect of Egyptian on Greek in Egypt, stating that particularly the widespread confusion of η <ē> and υ <y> were a sign of very early and advanced *iotacism* in Egypt (Gignac 1976: 47). However, crosschecking the orthographic variants of Greek loanwords in Coptic, we can see that υ <y> was not only confused with η <ē>, which admittedly raised to /i/ eventually, but also with ι <i>, ϵ <e> or the supralinear stroke in Coptic meaning schwa, or even back vowels such as ⲁ <a>, ο <o>/ ω <ō> or ογ <ou> although these other variants were not nerely as frequent (Girgis 1966: 80-81). The picture seems a bit different in light of this evidence; combined, all these depictions of Greek /y/ seem like representations of a retracted unrounded close front vowel, or at the other end of the spectrum, a rounded close back vowel. Coptic only had /i, e, ɛ, u/ in the close vowel inventory, so different writers chose different under-differentiated variants to depict the Greek close rounded front vowel. Therefore, choosing ι <i> does not necessarily mean /i/, when taking into account the choosing of ⲁ <a> by some writers.

When both of these variants are considered together, a picture of a retracted front close vowel emerges, such as /ɨ/ in Russian or Scottish English /ɪ/. The latter is actually even more open with some speakers, pronounced [ɛ̝], sounding more like [ɛ]; it is also pronounced with a schwa-like quality by some speakers (Scobbie, Gordeeva and Matthews, 2006: 7), in other words retracted from the standard /ɪ/. In fact, the pronunciation of /ɪ/ in Glasgow SE leans so much backwards with some speakers that is has been depicted with the representation 'mulk' in an article in an English newspaper;[36] the Glasgow vernacular variant is described as /ï/~/ɨ/

[36] 'Glaswegian tainted by the strains of Sarf Lunnun [South London]' by Fred Bridgland. The Independent (London), 28 June 2000. The article discusses the 'polluting' effect of southern slang, the so-called Estuary

by Stuart-Smith who cites Macauley (1977) already to have studied the range of variation as [ɪ, ɛ̝, ë, ə̝, ʌ̝] (Stuart-Smith 1999: 207-208). Following the standard British English in which the newspaper is written, this means an orthographic depiction of the phoneme [ʌ], a back open-mid unrounded vowel. In relation to Coptic Greek loanword usage, it seems that some of the Egyptian writers associated Greek /y/ with a close- to open-mid unrounded front/near-front vowel such as /i, (ɪ), e, (ɛ)/, going as far as depicting a (in their mind) a much retracted /i/ with ⲁ <a>, while other writers associated Greek /y/ with a close rounded variant, ⲟⲩ <ou>. In other words, as stated in the previous chapter, two routes are possible for the under-differentiated depiction of Greek /y/, either choosing the features *close* + *frontness* or *close* + *roundedness*.

Through the evidence of Coptic, we know that Egyptian had a smaller front vowel inventory than Greek. In the previous chapter I suggested the confusion between /u/ and /y/ to result from underdifferentiation and the /y/ to the Egyptian writer representing the close rounded phoneme /u/. This is still plausible, taking into account that Narmouthis Greek probably existed in a somewhat bilingual situation, and the spoken level of the language was involved in the form of dictation or reading the text out loud while writing. Curiously, as Gignac states only occasional occurrences of confusion between υ <y> and ου <ou>, and many more between υ <y> and η <ē>/ ε <e> (see previous chapter for clarification), these ones are lacking from the Narmouthis collection.

This in turn works as evidence for pushing the fronting of /y/ to /i/ forward to Roman/early Byzantine period, as there is not one example of /y/ being depicted with either ι <i>, η <ē>, or ε <e> in the Narmouthis Greek collection. More generally speaking, in Gignac (1976) there are occasional instances of fluctuation between υ <y> and ι, η, ε <i, ē, e> from as early on as the 1st century but numbers grow with later periods; what is more, the instances of /y, u/ confusion are not only limited almost exclusively to the Fayyum area, they are also limited to this early period of time represented by e.g. the Narmouthis collection. No doubt after this the unrounding of the phonemes /oi/ and /y/ started to accelerate, with which also the nonstandard depictions of /y/ with ι, η, ε <i, ē, e> started to increase, in phonemic quality matching the unrounded quality of one another.

There is less of the phonetically related confusion between /o, y/, which Gignac believes to be partly related to the raising of /o/ adjacent to /s/ (Gignac 1976: 293-294). More on this will follow in the next section.

English, generally on other British dialects, and in this case specifically Glaswegian. The influence is said to come from the popular television series EastEnders, and changing Glaswegian SE accent so that e.g. Glasgow variations such as 'mulk' are on the decline while Southern features such as /f/ for /θ/ are increasing ('toof' for 'tooth') . (2000 Independent Digital (UK)). More on the subject can be read from the website 'Web documents relating to Estuary English' run by the Department of Speech, Hearing & Phonetic Sciences (UCL Division of Psychology & Language Sciences), onto which the Independent article has been placed. The term 'Estuary English' was coined by David Rosewarne in a 1984 article of The Times Educational Supplement (London) and meaning the following: 'Estuary English is a variety of modified regional speech. It is a mixture of non-regional and local Southeastern English pronunciation and intonation. If one imagines a continuum with RP and London speech at either end, 'Estuary English' speakers are to be found grouped in the middle ground.' Altendorf gives the research history (Altendorf 2003: 9-10), complete with a description of the phonological features (Altendorf 2003: 13-14), of EE.

4.3.2.3 Stress related allophonic variation: /o/ and /u/

There is some interchangeable variation between ο <o> /o/ and ου <ou> /u/ in the Greek of OGN I, even if it is less than with /a, e, o/. According to Gignac (1976: 208), <o, ō> and <ou> frequently interchange with each other in Greek texts coming from Egypt. Gignac also states that the confusion between <o> and <y> exists elsewhere in Greek, but as a conditioned change, often word-finally, or e.g. adjacent to /s/, a coronal consonant, causing the vowel to raise and close in quality. The examples he mentions are from inscriptions from earlier periods before the major raising of the vowels, and it is more than probable that in these periods, Greek <y> was still pronounced [u].

There are some instances concerning the raising of /o/ to /u/ (mostly) word-finally in the Arcadian, Cypriot and Pamphylian dialects; raising of /o/ to /u/ is also found before a nasal in Arcadian, Cypriot, Lesbian and Mycenean dialects. In the Attic inscriptions, this feature is rare; some attestations exist from 5th century BCE Boeotia. (Gignac 1976: 293-294). Threatte mentions very few instances of confusion between ο <o> and ου <ou> and ο <o> and υ <y> in Attic inscriptions from ca. 725 BCE to approximately the end of the third century CE. The ones he displays concern isolated words and names such as προτανεια <protaneia> for πρυτανεία <prytaneia> 'presidency' and e.g. Πολυδάμας <polydamas> for Πουλυδάμας <poulydamas>, alongside some more obscure examples of possibly Ionian background (Threatte 1980: 217-219). Regardless of the existence of /o, u/ variation in some Greek dialects, it is unlikely that it would be related to Greek internal development in the Greek texts found in Egypt: indeed, according to Gignac (1976: 207 fn2, citing Mayser xx i2: 1; 75-77; 82-83), also in Ptolemaic papyri, there are only a few cases of /o, u/ confusion in the 3rd-2nd century BCE. This makes it interesting that it is a recurrent phenomenon in Greek loanwords in Coptic. The variation starts showing up in the Roman period Greek texts and Coptic renderings of Greek loanwords from the same time period so it seems obvious that the phenomenon is linked to the growing level of bilingualism, and that the source of this confusion might lie in Coptic phonology.

The tendency of Egyptian writers to replace Greek unstressed /o/ with another phoneme has been noted in Section 4.3.1, and is again relevant here. In Coptic phonology, /u/ was one of the vowel phonemes available for the unstressed syllable (Peust 1999: 250-254), and although in some cases the consonantal environment alone might affect the raising of /o/ to /u/ in Greek words, the evidence is scanty, and the overall interchanged confusion of /o/ and /u/ calls for another explanation. Transfer of native language allophones is a general tendency with second language users (Major 2001: 31; Weinreich 1979: 21) and I believe that more than the consonantal environment, the nonstandard writing forms are related to this phenomenon. The position of word stress, and especially the change of Greek standard /u/ to /o/, might be an indicator of transfer of Egyptian stress on the Greek word.

According to Gignac (1976: 211), most of the attestations of /o, u/ confusion occur initially and medially, with unstressed /o/ being replaced by /u/ and vice versa, precisely as according to Coptic phonological rules. Also Girgis (1966: 81-85) shows that when Greek unstressed /o/ appears word-medially, it is often substituted with <ou> in Greek loanwords in Coptic. As can be seen from Table 9 below, variation of /o, u/ within the Narmouthis ostraca comes in more forms than this with e.g. /u/ sometimes being depicted with <y>, and a number of the attestations probably relating to case confusion more than phonetics etc. Nevertheless, Gignac's findings are symmetrical and well attested, even in those words that are likely to involve morphosyntactic confusion so it stands to reason that Coptic phonological transfer played a role in them. Furthermore, regardless of the source of confusion, in most cases the graphemic alteration also coincides with the phonemic rules of Coptic stress, and the possible placement of it on the Greek syllables. For instance, probably for the reason that Coptic did not

have unstressed /o/, the Greek name Κλέοβις <Kleobis> has become Κλευπις <Kleupis> in OGN I: 22 (25).

Ostracon	Word/Name	Phonemic	Case/ Phonemic	Phonemic/ Graphemic	Unstressed/ Coptic
OGN I: 22 (25)	Κλευπις (Κλέοβις) <Kleupis> (<Kléobis>)	Yes			Yes
OGN I: 15	εκθρων (ἔχθρους) <ek^{h}trōn> (<ek^{h}trous>)		Yes		Yes
OGN I: 104	Ἑρμεινου (Ἑρμῖνον) <Hermeinou> (<Herminon>)		Yes		Yes
OGN I: 92	Μακρινου (Μακρίνῳ) <Makrinou> (<Makrinō>)		Yes		Yes
OGN I: 30	Τροειλου (Τρωίλος) <Troeilou> (<Trōilos>)		Yes		Yes
OGN I: 92	στρυφης (στροφής) <stryp^{h}ēs> (<strop^{h}ēs>)			Yes	Yes

Table 9. /o, u (y)/ confusion in OGN I.
The different sources of variation in the marking of Greek /o/ and /u/ are distinguished in this table. For convenience's sake, the last variable is marked 'unstressed Coptic' even though, lacking definitive knowledge, this is only the possible (or according to Peust (1999), even likely) position for it. Standard forms are in parentheses.

As can be seen, most of the examples presented here concern names. Although there are a couple of other curious instances of /o/ being confused with /u (y)/, it is nevertheless precisely names that offer the most evidence for this phenomenon. As presented in Section 4.1, names can offer evidence for phonological variation but one has to proceed with caution. In this instance, with the evidence-base consisting of the material of OGN I which already includes substantial variation, I would argue that the nonstandardised nature of names can actually be an advantage. Nonstandard writing forms of names offer even more variation than exists in regular vocabulary, all based on the phonological level, as the writers tried to catch the forms of the names by whatever graphemic means they could come up with in the absence of practiced standards. The writers being Egyptians, these endeavours naturally had traces of the L1 phonological and orthographic systems in them. Henceforth, for example unstressed /o/ in Greek words tended to be treated within Coptic prosodic rules, i.e. often written with <ou>. The different attestations in Table 9 will be analysed within relevant sub-sections.

As mentioned before, loanword adaptation can have a phonological or a phonetic basis. Although the /o, u/ confusion is phonological in that it clearly worked under Egyptian prosodic rules, I think most of the variation was phonetic, based on the actual pronunciation of Greek and the auditory perception of it, in many cases affected by Egyptian transfer; such as e.g. the usage of Coptic allophones in Greek in the case of /o, u/ variation. Writing forms based on the acoustic appearance of stress can no doubt be considered phonetic, as proven by the study by Dohlus (2005) mentioned in the introductory chapter.

Japanese does not have front rounded vowels. The French and German close front rounded vowel /y/ is adapted as /ju/ in loanwords given by these languages, but the mid front rounded vowels are marked differently depending on the language: German /œ/ and /ø/ are marked as /e/ and French /œ/ and /ø/ as /u/. Dohlus argues that the German loanwords are adapted on a phonological basis, whereas the French loanword adaptations are phonetically grounded; French loanwords in Japanese are formed according to the spoken form, whereas German loanwords have a longer history in the language and have had influence from

knowledge of orthographic conventions (Dohlus 2005:117-118). A similar situation is taking place in how Hawaiian Japanese treats English loanwords: earlier ones are taken from the written media, and later ones from the spoken level, each presenting a different form, with the earlier ones bearing a closer resemblance to the English written form. For example, English *gasoline* is *gasorin̄* in standard language, resembling the English phonological form with slight modifications, and /gˈasɯriṇ/ in colloquial Hawaiian Japanese, based on the phonetic form that is influenced by the L2 perception of the English phonemes (Weinreich 1979: 28).

Following these notions, it seems that most of the nonstandard alterations produced by the Egyptian scribes were phonetic ones. And if allophones are considered phonetic, coarticulation certainly is as well; furthermore, the effect of pronounced word stress, be it based on L1 or L2, has to have a weigh in the matter. In the following forms all are relevant for the phonemic-graphemic outcome.

An example of a phonetic approximation is κλευπις <Kleupis> from the standard Κλέοβις <Kleobis>.[37] This is probably just a graphemic representation based on an acoustic form of the realisation of this form. According to Layton, many such nonstandard forms were a combination of both realising the Greek phonological changes on the orthographic level, as well as replacing some of the original phonemes with native language ones. Therefore even Coptic manuscripts are full of graphemic fluctuation in representing /i/, varying between <ei, i, ē, y>, later (but rarely) even <oi>. This is, of course, a reflection of the changes in the Greek phonological system. On the other hand, there is the constant interchange of voiced and voiceless stops, following Egyptian phonology (Layton 2000: 33). Such intermixed confusion may be also behind this form because the first syllable of the word, now in the nonstandard production containing the Greek diphthong /eu/, could be a product of rapid pronunciation in speech, /o/ being assimilated to the manner of articulation of the following /e/, ending in /u/: in /e/ and /u/, the highest point of the tongue is the same as the constriction of the vocal tract, unlike in /o/. In a mora-timed prosodic system, which Greek originally had, /e/ and /o/ in separate syllables would have been easier to distinguish; /a-e/ and /o-a/ sequences are found in e.g. Maori, which is also mora-timed (first classification in Bauer 1981).[38] Similarly to what seems to be the case in Greek usage by the Egyptians, in New Zealand, Maori's stress system has actually even affected English stress placement, turning it more syllable-timed from the original stress-timed (Maclagan 2010: 159). The effects of the Egyptian stress system on Greek spoken in Egypt will be discussed in more detail in Sections 5.1.6 and 5.3.

According to Horrocks (2010: 164), Greek stress system changed from primary pitch accent to primary stress accent in the Roman period, i.e. 1st c. BCE to 3rd century CE. Furthermore, Coptic's lack of unstressed /o/ was often reflected on the orthographic level. Partly related to the interchanged usage of /y, u/, there are a couple of interesting instances in the Narmouthis ostraca where Greek unstressed <o> is replaced with <y>, probably meaning /u/ (see Table 9 above).

The stress in the standard form of *Kléobis* is on the /e/, thus cutting /o/ off into the next syllable. In a stress-timed language, this would have made the following /o/ even weaker than in a syllable-timed one, and probably leaving it vulnerable to assimilation to the previous phoneme's quality, further affected by the following bilabial, which alone would have been capable of raising the quality of /o/ to /u/ in anticipation of its pronunciation. Therefore it is entirely possible for the phonetic form behind the graphemic representation to be based on the Greek pronunciation of the time, the /e-o/ sequence simply turning into the diphthong /eu/, which the Egyptian scribes would have recorded in writing near-phonetically. However, to be

[37] The form is defined also as a phonetic variant also by the editors (Pintaudi & Sijpesteijn 1993: 4 8).

[38] In effect mora-timed in (Maori) means that each short vowel and the preceding consonant take approximately as long as each other (Maclagan 2010: 159).

cautious, it was probably at least strengthened by the Egyptian influence. If an effort was being made for the unstressed /o/ to be enunciated in Greek, the original stress lying on the first syllable's /e/ would have made the /o/ unstressed, which adjusted poorly to the Egyptian phonological system. With the stress-related system of allophony in effect in Coptic, it seems natural that /o/ should be replaced with /u/. In this instance, it is marked with <y>, which would already be explainable within the phenomenon of underdifferentiation of /u/ and /y/ in Egyptian; the graphemes could both have been seen simply as variants for the phoneme /u/. However, such a complex explanation is probably not necessary here as the scribes knew Greek, and knew very well that the diphthong /eu/ was written with the latter part consisting of <y>.

Nevertheless, the second syllable, at least, exhibits an unambiguous property of Egyptian phonology: it has the often seen voiceless stop replacing the voiced one. It also has /i/, which according to Girgis (1966: 79) is usually written correctly in Greek loanwords in Coptic; of course it had spelling variants with the usual suspects of later periods, i.e. <ē, ei, y, oi>. Peust (1999: 250-254) lists /i/ as one of the possible vowels for word-internal unstressed position. This is a phonological natural: it is one of the vowels at the extreme end of the vowel diagram, so it is easily distinguished from other vowels. It is difficult to determine where the stress lay in this word, if not according to the Greek original: it could have retained the Greek original regardless of the vowel variation occurring in the stressed syllable, which possibly was a product of the change in the Greek stress system and only written out as it was spoken, and heard. It is also possible that when it is particularly difficult to determine stress for a given word, it could lie not on a vowel but on the consonant; the syllable peak could consist of a syllabic consonant (see more referring to Depuydt below). In theory, this could be the case in *Kléobis* as the syllabic peak could be on /ß/, which in Coptic phonology was considered a sonorant, and sonorants in Coptic could serve as a nucleus for a syllable (Peust 1999: 263; see for 2.3.1 for more details). This is also a phonetic universal: sonorants tend to raise the vowel quality in world's languages, so this could serve as a combining effect in addition to the assimilation of /o/ to the manner of articulation of /e/.

Greek /b/ was probably a fricative [ß] at this time (Horrocks 2010: 169), as it was in Coptic. Interestingly, though, even in later Coptic texts, it was still replaced by <p> so it might have somehow differed in quality from the Greek one; this makes it unlikely that the graphemic form <p> would have reflected a sonorant, so a syllable peak lying on the bilabial can probably be overruled. Peust (1999: 92) remarks that in Late Coptic (about 1300 CE) there was a major sound shift which brought the voiceless/voiced opposition back again to Egyptian, but voicing did not proceed consistently in Greek loanwords. This is probably because Greek loanwords retained the fossilised articulation of the time they were borrowed, and following this, in <Kleobis> <b> remained /b/, but with Egyptian writers, /b/ and /p/ represented the same phoneme /p/, as did /g/ and /k/, and /d/ and /t/.

Apparently, in Coptic, as discussed in Section 2.3.1, the stressed syllable could be open or closed, but the posttonic syllable always had to begin and end in a consonant, i.e. it had a consonant-vowel-consonant sequence; on the other hand, the stressed syllable could end in a vowel or a consonant, so long as it was not a consonant cluster (Peust 1999: 176-182; Peust 1999: 82). If native language stress was applied in the treatment of Greek words, the stress in *Kleupis* should, according to this, be on the first syllable, as in this way, the posttonic syllable would begin and end in a consonant; also, this is a syllable that ends in a vowel i.e. should be considered as stressed. However, diachronic variation caused extensive irregularity regarding this also in Egyptian as many words by the Coptic stage of Egyptian ended in a vowel. By looking at Peust's examples (Peust 1999: 270-276), it does not seem as if there were any particular rules as to where the stress lay in two-syllable words, apart from one: if the word had /o/, it was in a stressed syllable.

It is difficult to say whether *Kleupis* has retained Greek stress or been treated within the Egyptian stress system but I am inclined to think that as the /o/ was replaced with /u/, it was considered unstressed; as was discussed in Section 4.1, names are frequently adapted to L1 phonological system, and this includes prosody. In my opinion, then, it is plausible to think that transfer of Egyptian stress was taking place here, shifting stress from the Greek original second syllable (in a trisyllabic word: *kle-o-bis*) to the second, i.e. last, in the Coptic disyllabic word. I believe <o> and <ou (y)> interchange in relation to Egyptian stress patterns, with the first taking the position of a rounded vowel in the stressed syllable and the second in the unstressed one. Nevertheless, as Egyptian clearly allowed stress on the ultimate as well as penultima, there is no reason why these could not have been retained in Greek words as well, should the syllable formation match the rules of Egyptian phonology. It is also wise to take into consideration that language users possessed varying levels of skills so some could have had perfect grasp on Greek stress whereas others were prone to transferring native language stress rules to Greek, so there are grounds for fluctuation of stress patterns as well as any variation in orthography.

In line with the previous example of phonological impact of Egyptian and the Greek unstressed /o/ being replaced with /u/, the odd writing form στρυφης <stryp^{h}ēs> belongs in the same category. *Kleupis* probably had some phoneme assimilation, and *stryp^{h}ēs* from the standard στροφῆς <strop^{h}ēs> 'turning, twist', is similarly subject to coarticulatory processes. This time the Greek stress is on the second syllable, and there would be no clue as to the possible placement of Egyptian stress if it were not for the nonstandard vowel grapheme in the first syllable - <o> has been replaced with <y>. If we assume again that Egyptian stress would not have been on the first syllable based on the nonstandard vowel in it, it is understandable for the Greek unstressed /o/ to have (again) been replaced with the better fitting /u/. If this is simply not a mere slip of the pen, it seems unlikely for anything else to be behind the usage of <y> than the confusing of /y/ with /u/. In addition, the weakened quality of the vowel has left it open for phonemic assimilation.

Bilabials can have the tendency to raise the open vowels' quality; in Greek, ο <o> was [o] i.e. close-mid, but in Coptic, ο <o> was [ɔ] i.e. open-mid. If we approach the subject from the point of view of a second language user, the quality of *omikron* here was probably open-mid, followed by the bilabial /p^{h}/. The nonstandard vowel is here also following a cluster of coronal consonants /s, t, r/, and although /r/ seems to generally centralise vowel quality in Coptic usage of Greek loanwords (Dahlgren and Leiwo (in prep.)), maybe this cluster as a whole was enough to contribute to the raising of the vowel quality (raising, rather than fronting, because it must be kept in mind that it was unlikely that <y> represented /y/, but probably the grapheme stood for /u/).

It seems unlikely that η <ē> in the second syllable would not have been stressed to be able to keep its quality, given the tendency of unstressed /e/ to fluctuate in quality in Greek loanwords in Coptic (Girgis 1966: 75-76 and 77-79). It therefore seems that Egyptian and Greek stress systems coincided in this word, leaving the possible usage of the Egyptian stress system by the language user undetected.

In light of the previous examples, it seems evident that the Coptic allophonic rule of the distribution of /o/ and /u/ affected the usage of these phonemes when the scribes wrote Greek. If we follow the theory of Coptic <o> and <ō> differing in quality rather than quantity, it nevertheless seems that regardless of the precise phonetic quality of Egyptian /o/, it is a phoneme reserved for the stressed syllable, and in the unstressed syllable the round vowel is manifested as /u/; in fact, Peust (1999: 175) states that in Coptic stressed syllables, there were three vowel classes, each with two members showing morphological alternations with one another. The back vowels were high <ō> and low <o> while the front vowels consisted of two pairs: high <i> and low <a>, and high <ē> and low <e> (respectively). <ou> is not a member in any class, i.e. not a part of the Coptic stressed vowel inventory. Peust says that because these

allomorphs are not motivated synchronically, vowel height cannot be predicted in relation to the phonetic environment. That may be a fact with Coptic-Egyptian but with Greek, there are countless examples of nonstandard vowel usage related to the consonantal surroundings.

If, on the other hand Egyptian vowels are taken to have differing quantities, as suggested by most Coptologists, it does not seem to matter in the treatment of Greek words, as both <o> and <ō> are replaced by /u/. If we take this approach, it seems that the phonemic input comes from Greek, in which the quantity of these phonemes was already lost in the Roman period, and there was no difference in quality either (Horrocks 2010: 167). On the other hand, who can say that the same did not happen with Egyptian, the vowel quantity vanishing as it had in Greek? The phonetic level, however, in this theory as well, becomes realised according to Egyptian phonemic/allophonic distribution due to Egyptian prosodic rules. Either way, the affecting factor behind the interchangeability of /o/ and /u/ seems to be the Egyptian prosodic rule in which the phonemes are at an allophonic opposition with each other. Nevertheless, all variation need not necessarily be related to Egyptian influence; it is possible for an assimilation such as in *Kleupis* from *Kleobis* to occur in the speech of native Greek speakers as well, especially if the stress system of Greek was already stress-timed. Modern day Tsakonian, along with other Northern Greek dialects, gives a good example of this, having the same tendency to fluctuate between unstressed /o/ and /u/; even standard language nowadays fluctuates in the first person plural verb ending between -ομε <-ome> and -ουμε <-oume> (Joseph, p.c.). However, examples presented in Section 5.1.4 of the same phenomenon taking place in Coptic renderings of Greek words point the finger to that direction, as does the nonstandard consonant usage.

An important question here is this: if the interchangeability of /o/ and /u/ is an indicator towards the stress peak in a word, whether based on Greek or Egyptian stress placement, why are the Greek unstressed /o/'s not marked with <e> as they are in Section 4.3.1 regarding the marking of the word-final schwa? According to Girgis, the nonstandard spellings in Greek loanwords in Coptic mostly concern the unstressed vowels, and are written with either <e> or the representative of this, the supralinear stroke, or <a>, <ei/i> or <ou>; in 'vulgar' spellings also <o>, <ē>, <y> or <ō>. The quality of the vowel is dictated by the quality of the adjacent consonant (Girgis 1966: 71-72). Some of the nonstandard spellings in this chapter can be explained in terms of this. *Kleupis* can be explained phonetically, the latter phoneme from the standard *Kleóbis*'s /e-o/ sequence assimilating to the manner of articulation of the former one, at the same time forming a diphthong (/e-o/ to /eu/), while *stryp*^{h}*ēs* from *strop*^{h}*ēs* could be a product of coarticulation regarding an anticipatory raising effect of the bilabial /p^h/ coming after the vowel, with the <y> probably representing /u/. But why is /o/ replaced with /u/ in these examples? Below is one explanation to the problem.

Coptic Detail: Variation between Coptic /o/ and /u/

Depuydt claims that Coptic stress accent had reduced in force and consequently the quality of vowels had become more unclear, leaving words with only one clear vowel and reducing all the others to schwa; this is the general consensus among Coptologists, but Depuydt emphasises the loss of importance for distinct vowel quality based on structural changes within the Egyptian language. Over time, Egyptian changed from a synthetic language to (more) an analytic one so that many grammatical features were in Coptic expressed with separate morphemes instead of patterns created with vowel distinction, such as the usage of verbal auxiliaries instead of the former vowel pattern distinctions for verb meaning. This, of course, made vowel quality somewhat redundant so that when simultaneous weakening of the stress accent on the principal vowel caused elimination of unstressed vowels, this form of language development

> could proceed largely without resistance because vowel quality simply was not as important for meaning as in the previous stages of Egyptian, which more resembled the word formation system in Semitic languages such as Arabic or Hebrew. Furthermore, besides the fact that only the stressed vowel often survived this new development, sometimes not even that remained of the word's original vowels, leading to a situation in which sometimes an adjacent consonant took the function of the syllable apex. This tendency created the peculiar system in Coptic phonology of any consonant being able to function as syllable peak, even stops, although sonorants were more prone to act as such. (Depuydt 1993: 347-349).
>
> Depuydt's theory is slightly different from the other Coptologists, as mostly they emphasise Coptic having a strong stress accent (see e.g. Girgis 1966: 73) which caused reduction on the unstressed syllables' vowels, when in fact it seems that the strong (primal) accent had weakened, further decreasing the quality of the other, unstressed vowels in the word, sometimes to zero.

As can be seen from the description above, Coptic phonology is a matter of some debate even among Coptologists so it is sometimes difficult to get a definite answer to some of the questions. Regardless of the precise theory behind the development of the Coptic vowel system, however, it is certain it had a significant amount of (near-)centralised unstressed vowels, and schwa, by categorisation the neutral vowel without distinct articulatory requirements, leaves the tongue body to be highly variable during the production of it.

Lingual contact in consonant to vowel coarticulation for schwa can consist of the centre and sides of the palate surface, extending until the alveolar zone adjacent to dental and alveolar consonants, until the prepalatal zone with adjacent alveolopalatals and palatals, and mediopalatal zone with adjacent velarized [ɫ], velars and labials (Recasens 2006: 82-83.) It comes as no surprise, then, that schwa might be highly affected by the quality of the adjacent consonants. When most of Egyptian vowels in a word were in actuality schwa, the presence of so many nonstandard vowels becomes understandable. Regardless of that, as much as many nonstandard spellings can be explained with coarticulation, in my opinion prosody has the greatest effect on the nonstandard production of Greek by the Egyptian scribes because naturally, the unstressed vowels would be the most affected by consonantal surroundings. This being said, though, it is problematic for obvious reasons: with written material, it is never completely clear whether the prosodic rules followed are those of the native tongue (i.e. transfer) or based on the auditory input of the second language.

It seems more than likely that both are involved. Greek pronunciation was known, but the level of Greek knowledge among the Narmouthian scribes does not appear to have been great, judging by e.g. the lack of ability to follow Greek case agreement. With limited Greek knowledge, the stress rules of the scribes' native language would have had an effect on the Greek they were using. There is enough information in the texts to assume that Greek pronunciation was known (e.g. the interchanged usage of <y> and <oi> for /y/ explained in the previous chapter), so the original model for Greek word prosody must have come from Greek, but perhaps changed in usage to better match the intonation patterns of the native language. It is also possible that a genuine Egyptian Greek variety was in formation, in which case the origin of the speaker does not matter as much as is assumed here (more on this in Section 5.3).

When vowel quality in Egyptian was less clear and important than in Greek, this would have affected the production of Greek. Girgis (1966: 71-72) says about the nonstandard spellings of Greek loanwords in Coptic that this was how Egyptians pronounced Greek, and that it does not necessarily have anything to do with how the Greeks themselves spoke. This is an important point. If we take, then, for a fact that Egyptian words only had one clear vowel

phoneme reducing all others to (near) schwa and also believe that Egyptian words seldom had the stress on the antepenultima, the discrepancy between replacing the Greek /o/ with /e/ in words like *kerason* and with /u/ in words like *Kleupis* or *stryp^{h}ēs* can perhaps be explained.

First, it seems logical to assume that the syllable which carries the nonstandard vowel was the unstressed one in Egyptian phonology. But this is not all there is to it: it seems that regarding the neutralisation of vowel quality, it matters where exactly the unstressed vowel was positioned in the word. According to Flemming (2009; 2004), schwa quality is different word-internally and word-finally, with word-internal schwa being much more prone to assimilate to the quality of the adjacent vowels or consonants. What is more, labials and velars are more substantially affected by the nearby vowels than for example coronals; the study was of American English schwa quality so vowels were under inspection more than consonants, but presumably this could go the other way as well with consonants' effect to vowels near them. Be that as it may, there is more fluctuation in vowel quality in the middle of the word partly because word-internal schwa is very short, and partly because it does not minimally contrast with other vowel qualities (although the latter is probably not relevant to Coptic). The short duration of the word-medial schwa simply makes it difficult to move from an articulatory position to another quickly so coarticulation happens more easily; the targeted vowel is not reached in time, so if the targeted vowel is schwa, it will have residue from the surrounding phonemes with it if it occurs in the middle of the word, whereas word-finally, the target can be reached because there is nothing following it.

This taken into consideration, *Kleupis* and *stryp^{h}ēs* seem to have assimilated the nonstressed vowel, i.e. schwa, more strongly to their surroundings, to the quality of the bilabial, which has retained the vowel quality as round, but been changed from the Greek original /o/ to a more suitable one in Coptic. When it could not be /o/ in the unstressed syllable, it was marked down as /u/. In *kerasen* from the standard *kerason*, however, <e> is marking schwa as it normally was in Coptic, and this time the grapheme is indicative of a centralised vowel proper, /ə/. This theory gives these phonetic forms to the aforementioned words: [kleuˈpis] and [struˈp^{h}es] (Coptic underdifferentiation of /y/ and /u/ taken into account), and [kᵊˈrasə(n)]. Both *kleupis* and *stryp^{h}ēs* are also bearing stress on the syllable that begins and ends in a consonant, as could have been what Coptic stress rules dictated. It is also possible that *stryp^{h}ēs* has been influenced by Coptic orthographic conventions, combined with underdifferentiation of Greek /y/ as mentioned above. The matter of Coptic spelling conventions will be discussed in more detail for all phonemes in (Dahlgren in prep. (a)).

4.3.2.4 /o, u/ variation with possibly morphological background

As briefly mentioned in the previous chapter, some of the nonstandard forms are more likely to present unsuccessful case inflection than phonological transfer, even if vowel changes take place. Egyptian had no cases so quite understandably, Greek texts from Egypt abound with nonstandard case inflection. The merging of dative with accusative started in the Ptolemaic period and continued and expanded to merger with genitive in the Roman period, finally resulting in e.g. accusative as the 'default' prepositional case (Horrocks 2010: 115-117[39] and 180-181; Stolk (2015: 71, 74), however, argues that it may have been due to a difference in meaning related to some prepositions, and in the Byzantine period related to the phonological developments causing phonetic similarity in these case endings).

[39] Horrocks cites *P.Paris* 47=UPZ 70 (152-151 BCE) for accusative/dative replacement and *P.Flor.* 127 (CE 256) for genitive/dative replacement.

This added to the confusion of vowel quality, as discussed in relation to personal pronouns in Section 4.3.2.1; the case merger was probably one of the reasons that caused the large amount of intermixed usage of /o/ and /u/ mentioned by Gignac (1976: 208); particularly ω(ι) <ō(i)>, the marker for dative ending, tended to be replaced with ου <ou> (the marker for genitive endings in Greek) in unstressed word-final positions. According to Gignac, many cases in which these phonemes are interchanged are explainable through e.g. confusion of second declension genitive and dative, but confusion is more frequent when ου <ou> and ω <ō> are involved. Incidentally, in Coptic phonology, ω <ō> had a closer vowel quality to ου <ou> than did ο <o>, as ω <ō> was phonetically [o] and ο <o> was [ɔ] (see Section 2.3.1 for Coptic phonological features), so keeping this fine distinction audible must have been difficult especially in an unstressed position.

Following that note, in this section I will examine the possibility of phonology playing a part also in the nonstandard production of the forms that on the surface level look like simple confusion of case. In what follows I will analyse the possible phonological and phonetic processes that might have contributed to the nonstandard forms/names Μακρινου <Makrinou> (OGN I: 92), ‘Ερμεινου <Hermeinou> (OGN I: 104), Τροειλου <Troeilou> (OGN I: 30) and ἐκθρων <ekt^{h}rōn> (OGN I: 15). In Table 10 below, these have been categorised according to whether it seems likely that the confusion is related to inflection or might be phonemic (sometimes both seem possible); whether the possible phonemic confusion might coalesce with the phonological rules of Coptic; and finally, whether the nonstandard vowel occurs in an unstressed syllable (Greek original or possible Coptic, as indicated respectively).

OGN I	**Word/Name**	**Case**	**Phonemic**	**Coptic phonemic environment**	**Unstressed:** ***Greek*** **Coptic**
15	ἐκθρων <ekt^{h}rōn> PL GEN (ἔχθρους) (<ek^{h}t^{h}rous>) PL ACC	Yes	No (?)	No (?)	*Yes*
104	Ἑρμεινου <Hermeinou> GEN (Ἑρμῖνον) (<Herminon>) ACC	Yes	Yes	o → u / n_	*Yes*
92	Μακρινου <Makrinou> GEN (Μακρίνῳ) (<Makrinō>) DAT	Yes	Yes	o → u / n_	*Yes*
30	Τροειλου <Troeilou> GEN (Τρωίλος) (<Trōilos>) NOM	Yes	Yes (?)	o → u / L_	*Yes*

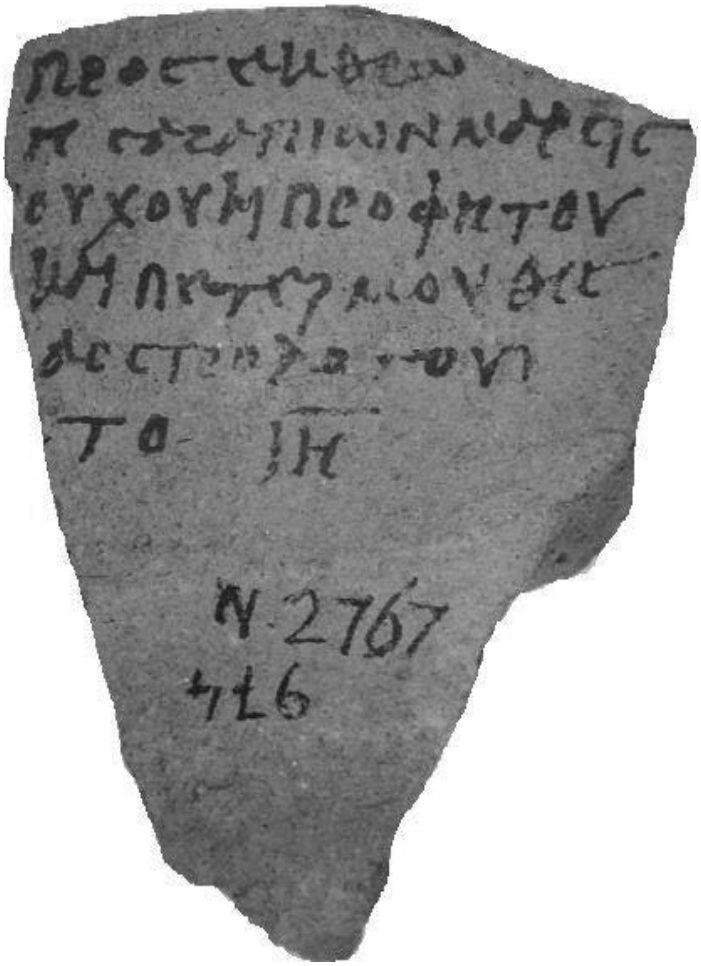
Table 10. Categorisation of /o, u/ confusion related to Egyptian influence.

Note that all of the nonstandard forms seem to be in genitive from originally two accusatives, one dative and one nominative. Certainly one of the reasons possible for these modifications could be the context or the document type. In OGN I: 15, for instance, simple analogy based on the following word could be all that was going on; the contents is dedicated “to the enemies of Sarapiōn”, so the *-ōn* ending of the name could already have entered the mind of the writer when he was starting ‘the enemies’, meant to be in the accusative plural with the ending *-ous*, and (perhaps accidentally) ending in genitive plural with the same ending as in the following name, *-ōn*. Writing involves planning ahead, so sometimes there are mistakes that are based on

the writer already thinking about the next word, whilst still writing the current one. The text of OGN I: 15 can be seen below in (14).

(14) OGN I: 15
Appunto

1. πρὸς ἔκθρω-
<pros ekt^{h}rō->
2. ν Σαραπίων Μαρσισ-
<n Sarapiōn Marsis->
3. ούχου καὶ Προφήτου
<ouk^{h}ou kai Profētou>
4. καὶ Πετέρμονθις
<kai Petermont^{h}is>
5. ἀστρλόγους.
<astrologous>.
6. τὸ ῑη
<to 18>



Picture 3. OGN I: 15, The Cairo Egyptian Museum (pictures taken from the originals by Dr. Angiolo Menchetti).

”To the enemies of Sarapion: Marsisoukhos and Prophetes and Petermonthis, astrologers. Nr. 18.”[40]

Gignac mentions that confusion of ο <o> and ου <ou> is also frequent initially and medially, albeit not word-finally, but with the tendency of unstressed /o/ being replaced with /u/ and stressed /u/ with /o/. A picture emerges of the Egyptian scribes having an idea of word-final /o/

[40] The editors also give an alternative translation in which Sarapion has a patronymic, slightly changing the meaning of the sentence: “To the enemies of Sarapion son of Marsisoukhos, and Prophetes and Petermonthis, astrologers. Nr 18.” (Pintaudi and Sijpesteijn 1993: 42).

being normally written with ω <ō>, because phonologically, there seems to have been no difference between the usage of *omega* and *omicron* as according to Gignac, in Greek ο <o> and ω <ō> had merged and both represented /o/ (see also Horrocks 2010: 167-168 for Greek in Egypt). The interchanged usage between /o, o:/ and /u/ is rare elsewhere in Greek but is paralleled in nonstandard forms in Greek loanwords in Coptic, and is therefore indicative of Egyptian impact on Greek (Gignac 1976: 213-214).

Gignac includes /u/ in the inventory of (Fayyumic) Coptic long stressed vowels as well, but I have taken the point of view of e.g. Peust (1999: 201) of vowel distinctions to be of quality, not quantity. Nevertheless, Gignac marks the long stressed vowel /o/ to be the allophone of /ɔ/, so the distinction kept between these two phonemes in Coptic was minimal. Gignac also indicates that in the inventory of unstressed vowels, /u/ was an allophone of schwa (Gignac 1976: 330-332). This is interesting in light of what was mentioned of schwa quality in relation to its duration in the previous chapter (Section 4.3.2.3); when schwa is word-final, it is longer in duration and therefore more likely to reach its target phoneme (Flemming 2009: 79-86, 89-91; see also Flemming 2004), i.e. in the case of the supposed native language standard *Trōilos* /troilos/, a round vowel to finish off the word. Following this theory, this is almost accomplished in the nonstandard production *Troeilou* /troilu/ with the various phonological/phonetic processes producing a somewhat different but nevertheless a round vowel. Henceforth, if we understand the unstressed Greek /o/ having been perceived as schwa when processed through the Egyptian phonological system, if a round vowel was wanted for the (Egyptian) unstressed syllable, /u/ seems an obvious choice from the point of view of Egyptian phonology; of course, this also makes sense from the point of view of Greek inflectional morphology, instead of e.g. using /e/, the 'default' unstressed vowel for Egyptian.

The dative/genitive merger has been studied by Joanne Stolk, who came to the conclusion that while phonology may have played a part, the merger was mainly based on semantic and syntactic overlap between the functions of dative and genitive, possibly triggered by changes in word order (Stolk 2015: e.g. 14-16 of the Introduction and 71; for more detail, see articles 2 and 3). However, certainly one of the factors in this can have been the allophonic status of Egyptian /o/ and /u/. As so often with this material, this, too, seems to be a matter of many simultaneous reasons combined in the outcome. As in Greek texts of the time, even Crum (1939: 517a-b) mentions that there is interchangeability in Coptic texts between ο <o> and ω <ō> in "inaccurate, especially Fayyumic texts";[41] Crum also describes ϒ (οϒ) <y (ou)> as "a vowel for ο <o>" (Crum 1939: 467a-b) and introduces ο <o> as "the 15th letter of the alphabet, called οϒ <ou> (/u/) in S[ahidic], οϒ, ο <ou, o> in B[ohairic]" (Crum 1939: 253a; see also Loprieno 1995: 25). The highly fluctuant nature of /o:, o, u/ seems obvious from these remarks of Crum.

Coptic not having unstressed /o/ was reflected on the orthographic level; /u/, on the other hand, was one of the possible vowels for unstressed syllables (see Peust 1999: 253 and Gignac 1976: 332 for vowel inventory for Fayyumic), and often seen in place of /o/. Another point to bear in mind is that Coptic neutralised the difference between /o/ and /u/ adjacent to /m/ and /n/. Therefore, besides disliking /o/ in the unstressed syllable, Egyptian also replaced it with /u/ in certain phonemic environments. For instance, if /o:/ (ω <ō>) forms a syllable with preceding (non-syllabic) /m, n/, it is according to Layton "always manifested as /u/ (οϒ <ou>)" and otherwise as /o:/ (ω <ō>). Layton (2000: 21) gives a paradigm example of the possessive prefix formation in single masculine, single feminine, and plural:

[41] Although Grossman has suggested an independent Narmouthian Egyptian dialect (mentioned in Section 2.2), Fayyumic, if not the local one, was probably still the closest Coptic dialect to Narmouthis.

πω= <pō> /po/
POSS.PREF.SG.M
τω= <tō> /to/
POSS.PREF.SG.F
ⲛⲟⲩ= <nou> /nu/
POSS.PREF.PL

Hence, /u/ is an allophone of /o:/ in Coptic (Gignac 1976: 214; Layton 2000: 21; Peust 1999: 238, Depuydt 1993: 355). The phenomenon is easily corroborated by looking at these entries in Crum; indeed, fewer words are found with ο <o> and even fewer with ω <ō> directly following the nasals, but quite a few exist with ου <ou> /u/ after them. It is also frequently the case that when there is /o/ after a nasal consonant, it is often a digraph, i.e. <oo>. According to Peust (1999: 222-223) the Paleo-Coptic *a* resulted in two variants in Coptic: the high variant ω [o] and the low one, ο [ɔ]. Following the quality theory on Coptic vowel system, this first of all indicates that the vowel quality of <o> was /ɔ/, i.e. one step further away from /u/; second, the vowel has been marked for length with the use of the double <o>. Therefore, short /o/ seems to have been particularly disfavoured after nasals. Perhaps this was for ease of distinction? Nasals tend to raise open vowels (see below for more on this). /ɔ/ is open-mid and when raised, nearer to centre. It may be that a short unstressed central rounded vowel was possibly just "swallowed" by the preceding nasal – hence, at least it was wanted as long, and as far retracted from /u/ as possible.

All in all, it seems that the vowel quality in this case in Coptic is affected by the nasal consonant. According to research on nasalisation, the vowel quality tends to raise due to it,[42] unless it is phonemically distinctive (Beddor 1983: 30). Furthermore, in many (if not all) languages in the world, vowels have a tendency toward allophonic nasalisation near a nasal consonant (Beddor 2014: 173-174). Peust claims that a late form of Egyptian had subphonemic (i.e. allophonic or phonetic) nasalisation causing sound changes that reflected a (general) vowel raising in the environment – the articulation of the vowel has been somewhat nasal if the nasal preceded the vowel; if it followed the vowel, it tended to provoke dissimilation instead. While this supposedly was not a distinctive feature in Coptic, synchronic evidence of it is still visible in e.g. some Coptic (status pronominalis) verb forms; Coptic also had words in which an additional <n> had been added, apparently to indicate a nasalised vowel (Peust 1999: 238; 248-249).

Be that as it may, this phonological feature of Coptic phonology might explain *Hermeinou* and *Makrinou* (both coming from name lists of uncertain meaning) as in both cases, the change from the standard vowel /o/ to /u/ takes place precisely after /n/. However, the phenomenon of Coptic reducing /o/ to /u/ adjacent to /m, n/ serves as a perfect example alongside other Egyptian-influenced variation in Greek. It is not regular. It sometimes shows in nonstandard spellings of Greek /o/ but it does not completely apply to Egyptian influenced spelling of Greek, nor to the nonstandard usage of Greek loanwords in Coptic. Both have /o, u/ confusion that seems allophonic and is undoubtedly influenced by Egyptian, but not only after /m, n/ (further details will be provided in Section 5.1.4).

Troeilou is possibly one such example. Greek words were alien to Egyptians and not entirely suitable to native language phonological or orthographic rules. Furthermore, the standardisation of Greek orthography caused additional confusion as the phoneme-grapheme correspondence was not a perfect match. This lead to a situation where sometimes the standard spelling was remembered and sometimes not, which may explain much of the fluctuation. On

[42] To be precise, close (nasal) vowels tend to retract in quality and open vowels raise, just like with bilabials (Beddor 2014: 180-181).

the other hand, Depuydt (1993: 355, based on the analysis of Vycichl 1991) claims that /u/ was also "remarkably frequent" before /r/, giving the examples ϩⲁϣⲟⲩⲣ <bas^{h}our> 'saw', ⲕⲣⲟⲩⲣ <krour> 'frog', ϫⲟⲩⲣ <k^{s}our> 'ring', ⲕⲟⲩⲣ <kour> 'deaf' and ϩⲣⲟⲩⲣ <hrour> 'to be quiet/content'. Following the more usual Egyptian phonological developments, the /a/ in the ending *-ar* (allowing some dialectal exceptions) in the etymological forms of these words should have developed into <ō> /o/ (-ⲱⲣ <ōr>) as it has in e.g. ⲥⲱⲧⲉⲙ <sōtem> 'to hear' from the etymological form **saḏim*, not /u/ (-ⲟⲩⲣ <our>) as is the Coptic formation from e.g. **harāraw* 'to be quiet/content' as ϩⲣⲟⲩⲣ <hrour> (Vycichl 1991:).

It could be deduced from this evidence that /r/ raises the quality of /o/ in the same way as nasalisation does. Peust (1999: 240-243), however, suggests that vowel raising only appeared in front of /r/ in Semitic loanwords, due to an originally velarised quality of Semitic liquids, still present in some of the more archaic vocabulary, such as *allah*. At least ϫⲟⲩⲣ <k^{s}our> 'ring' and ⲕⲣⲟⲩⲣ <krour> 'frog' are, according to Peust, either Semitic (first) or of unclear etymology (second).[43] Late Egyptian, on the other hand, might have had palatalised liquids /r/ and /l/, based on the fact that they had a tendency to develop into /j/ in later language forms, so they were certainly articulated in a different manner from the possibly velarised Arabic liquid consonants. Egyptian words, according to Peust, had the more frequent phonetic tendency of having <ō> /o/ rather than <ou> /u/ in front of /r/; the quality of Coptic /r/ was under discussion also in Dahlgren (2016a) with the same result of front vowel quality retracting near it.

Related to the quality of Egyptian-Coptic /r/, here is a brief discussion on Egyptian etymology and the consonantal coarticulation related to it, a subject of great relevance for this study. According to Peust, Egyptian a_{high} and u_{high}[44] normally develop into into <ō> and <e(i)> (respectively) in Coptic, but before nasals and /j/ the development is <ou> and <ē>, i.e. vowels take a more raised position in these environments. However, before /r/ and /l/ the situation varies in the aforementioned manner, so that the vowels result in a conflicting manner in either /o/ or /u/ (for a_{high}), or /e/ or /i/ (for u_{high}) (see also Peust 1999: 231). When looking at the quality of /r/, there is an interesting additional feature in Peust's example words if they are looked at from a coarticulatory point of view, that is it seems that the native language words (Peust 1999: 240) also have many phonemes that might naturally lower the quality of close vowels, for example some of the so-called 'emphatic' i.e. pharyngealised consonants, bilabials, and glottal fricatives.

In the one exception of the group where none of these are present, the vowel has raised to /u/, and perhaps the others might have as well were it not for the restricting effect of the aforementioned consonants (although the sample is too small to say). In the group of possible Semitic loanwords (Peust 1999: 241) there are no phonemes that typically lower vowel quality dramatically, and (perhaps consequently), the vowel after /r/ is /u/. There are two words of "unclear etymology" that have /u/ before /r/ regardless of the presence of a uvular in the first word's etymological word, and an emphatic consonant in the second's, although it is perhaps worth mentioning that the second one only exists in a Bohairic dialect attestation, and Bohairic seems to have flexibility in /o~u/ variation, as is visible in the last group of (two) late Semitic loanwords Peust offers that were first attested in Demotic.

In Demotic, there has again been an emphatic consonant in the first one with the round vowel being /ō/ in Sahidic Coptic but with attestations of /o~u/ in Bohairic, while the second one boasts <ō> in the Coptic rendering of it in the environment of after a velar and before /r/ in both dialects. In Arabic loanwords in Coptic this is a typical feature that reflects the contemporary (i.e. later than the older Semitic loanwords in Egyptian) phonological rules, in

[43] According to Vycichl (1983: 33b) and Černý (1976: 29), ϩⲁϣⲟⲩⲣ <bas^{h}our> is also of Semitic origin.

[44] These terms mean different phonological developments for the original Egyptian vowel set (/i, a, u/. a_{high} developed to /o/ apart from near nasals and /i, j/, and u_{high} developed to /e/.

which /r/ has clearly changed quality and usually lowers the quality of the vowel in the same way as glottal fricatives and pharyngealised consonants do (more information on this in Section 5.2).

In general, then, it seems that etymologically, the adjacent consonant's quality had an impact on the outcome of the vowel developments. The clearest evidence for this comes from nasals: for instance, a_{high} developed into /u/ after /n, m/, whereas u_{high} developed into /e/ in the same consonantal environment (Peust 1999: 231-232 and p.c.). This is understandable based on the bilabials' tendency of retracting the quality of close vowels, but raising that of open ones, which will be discussed in more detail in Section 5.1. Therefore, it might be possible that Egyptian liquids were simply more fluctuant in place and/or manner of articulation within a word, perhaps affected by the other consonants' (or vowels') quality nearby as I suggested above. Universally, the phonetic property of liquids are somewhat fuzzy, as I will explain below.

Phonetic Detail: The phonemic properties of liquids in Egyptian-Coptic

Regardless of the exact quality of a rhotic consonant, /R/ (representing all variants associated with all /r/-like sounds, be they trills, taps or approximants) as a general category seems to be vulnerable to variation even by the same language user, depending on the position of the phoneme in the word, and assimilation to e.g. vowel quality is frequent; the approximant /r/ has a constriction not much tighter than vowels and glides have so it is particularly vulnerable for variation (Scobbie 2006: 338-339).

Bilabial manner of articulation, on the other hand, cannot be very much altered or the situation in the consonant quality changes significantly; in fact, labials have been proven to be the most resistant to vowel-on-consonant coarticulation (Zharkova 2007: 5-8, 15), so they obviously tend to keep their quality. Analyses of /r/ usage in Scottish English (Stuart-Smith 1999: 210 for Glasgow and Chirrey 1999: 228 for Edinburgh) and Brasilian portuguese (Rennicke 2015: 40-56) each show results of a wide variety in the quality of /r/, which is, in addition to various sociolinguistic reasons, partly based on the position of it in the word, and partly on coarticulatory allophones.

Therefore, it might be thought that the quality of /r/ in Egyptian might have similarly varied according to the phonetic context, having carryover effects of the previous phonemes or being affected by the syllable position, and thus vowel quality might similarly be altered near it, or liquids in general, following their quality, to either more raised or retracted. According to Peust (1999: 231-232), near liquids, a_{high} developed into /o/ or /u/, as in the comparison between Semitic loanwords and Coptic proper, and likewise, u_{high} developed either into /e/ or /i/; interestingly, i_{high} only developed into /i/. Speculatively speaking it looks like liquids in Coptic had the ability to raise at least some vowels; based on the fact that there is no low variant for /i/ in connection to liquids, maybe even most, apart from those that had too much resistance from e.g. adjacent back consonants occurring within the same word as liquids. The investigation of the quality of Coptic /r/ and the coarticulatory effect of it on vowels is continued in Henriksson, Dahlgren and Vierros (in prep.).

Of course, synchronically the language user is more than likely not aware of these historical sound changes, but nevertheless is at least unconsciously prone to repeat a certain type of allophony related to phoneme environments, even in second language use. According to Peust, Egyptian might originally have had three liquids (written with two graphemes), /r/, /l/. Earlier Egyptian /r/ mostly corresponds to /r/ in Coptic words,

albeit there are many occasions where it turns up as /l/, possibly stemming from an earlier dialectal divide (Heliopolitan; see e.g. Loprieno 1995: 31) or because there were two distinct phonemes, /r_2/ and /l/, besides /r_1/; the former two became /l/ and /r_1/ became Coptic /r/. There are also occasions where <n> seems to indicate /l/, and indeed there was a special sign for words with /l/, written <nr>, in the hieroglyphic script of the Late Kingdom: mostly this was used for borrowed words, but occasionally also native ones. Out of this practice Demotic Egyptian coined a new grapheme from <r> to stand for /l/ by adding a diacritic stroke to it. (Peust 1999: 127-130).

From all this evidence, it seems as though it might be reasonable to assume that liquids were also phonemes able to raise the vowel quality in the same way as nasals and /j/, especially with this close connection of /r/ and /n/ even in writing – essentially the ancient digraph <nr> meant "say /r/ in the way of /n/, and you will get what is needed", which, of course, is /l/. /n/ and /l/ are phonetically similar in that they are both coronal consonants produced with the front part of the tongue, articulated against the alveolar ridge, and sonorants. /r/ is not a sonorant. The <n> in the digraph then marks the <r> as a sonorant, a phenomenon which is in use in e.g. Modern Greek when /b/ or /d/ is needed for foreign words, Modern Greek having lost these phonemes to fricativisation – what used to be /b/, written with *beta* in Greek developed to [ß] and is now [v], and the former /d/ written with *delta* is now pronounced [ð]. When foreign words or names have a need for /b/ and /d/, they are written down with digraphs with a sonorant before a voiceless bilabial or dental stop, so that they become [b] and [d], respectively, again. Following this system, for instance the loanword *banana* is in Modern Greek written μπανάνα <mpanana>, in which the voiceless bilabial plosive has been voiced with the aid of the preceding bilabial nasal. The phonetic outcome is recognisable: /banana/. In the same way, the famous Swedish actress with the impossibly foreign name is in Modern Greek transliterated as Ιγγριντ Μπεργκμαν <Iggkrint Mpergkman>: /Ingrid Bergman/.[45] Again the needed phonemes have been attained with the aid of sonantised voiceless plosives, i.e. /d/ written as <nt>, /b/ as <mp>, and /g/ with adding the voiced fricative *gamma* /ɣ/ before *kappa,* <gk>. The same useful system was also in use in Greek loanwords in Coptic (Peust 1999: 89); examples are provided in Section 5.1. It was also in use already in Later (hieroglyphic) Egyptian in e.g. the renderings of foreign names, such as that of the Achaemenid king Darius sometimes written in Egyptian with an initial <nt> besides the more frequent <t> (Peust 1999: 88).

After that rather lengthy consideration of the quality of liquids in Egyptian and Coptic, I would like to return to the issue of *Troeilou*. If all of the aforementioned is to be taken into account, it might very well be concluded that while <Troeilou> might be a mistaken form of genitive when a nominative (<Trōilos>) was needed, it is also possible that the form is a result of a few phonological/phonetic processes caused by the handling of the name through the impact of the writer's native tongue, Egyptian. As explained, Egyptian /l/ might have caused the vowel quality to raise, (/l/ is linguistically classified as a sonorant and a coronal, both noted for the fronting effect of them on vowels) and therefore the /l/ alone, without any effect of case confusion, might have caused the writer to produce a form based on the phonetic outcome of the name, in which the unstressed /o/ has been replaced with /u/ because of the raising effect of /l/. Furthermore, losing word-final -*s* was a very frequent phenomenon in Greek in Egypt

[45] I thank Martti Leiwo for this marvellous example.

(Gignac 1976:124-125). Therefore, if we take the loss of the word-final -*s*, and add to it the raising effect of the /l/, the standard /troˈilos/ is transformed into the nonstandard /troˈilu/.

There are again two ways to interpret the results, as in Chapter 4.3.1 of /a, e, o/ confusion, also related to the possible impact of the Egyptian stress system. First, there is the coarticulatory effect of the consonants to take into consideration. Where standard /o/ has been replaced with /u/, the change occurs adjacent to coronals/sonorants, as in <Hermeinou>, <Makrinou> and <Troeilou>. As explained in Chapter 3, it is a universal tendency of coronals to raise the vowel quality in languages, but regardless of this universal tendency, this is a misspelling that is not very frequent in texts written by native Greek writers from earlier periods.[46] Despite being a phonetic universal, it is however also another phenomenon related to Egyptian, to the aforementioned phenomenon particularly of /m, n/ and possibly liquids raising the round vowel value. Only <Makrinou> of these examples has an original ω <ō> being replaced with ου /u/. All other examples have ο <o>, but ο <o> and ω <ō> interchange in other positions, such as in <Troeilou> from the standard <Trōilos>. Greek loanwords in Coptic and even nonstandard spellings Coptic internal have the same interchange of <o> and <ō> (see e.g. Girgis 1966: 81; Worrell 1934), so if there was a difference of phonemic quality or quantity between these two, it seems to have been neutralised toward the later periods of Coptic.

Interestingly, the final word <ekt^{h}rōn> (OGN I: 15) has a nonstandard /o/ instead of /u/, so unlike in all the other examples presented in this chapter, the vowel quality is retracted instead of raised. Here, too, a couple of things could have worked together as a process, creating a nonstandard form similarly to <Troeilou>. Final -*n* was, as final -*s*, often dropped in Greek in Egypt (Gignac 1976: 111); it is also a typical Greek internal feature, unlike the dropping of word-final /s/ (Horrocks 2010: 112-113 and 171-172). Furthermore, Gignac (1976: 249-262; 330) noticed that often, vowel quality is lowered with close vowels: <i> /i/, <ei> /(e)i/, and <ē(i)> /e:(i)/ are all often replaced by <e> /ɛ/ before /r/; at the same time, <e>, <ai> /e/ are replaced by <a> in the same contexts (Gignac 1976: 278-286; 330).

By these examples it indeed looks like /r/ has a quality in Coptic that retracts adjacent vowels' quality, as was briefly noted in Dahlgren (2016a) and Dahlgren and Leiwo (in prep.). With a process of first dropping the /n/ at the end of the nonstandard *ekt^{h}rōn*, and simultaneously in the spoken language ignoring the final /s/ in the standard language form *ek^{h}t^{h}rous*, <ek^{h}t ^{h}rōn> and <ek^{h}t^{h}rous> become [ɛkt^{h}ro] and [ɛk^{h}t^{h}ru] phonetically. If it is accepted that Egyptian /r/ retracted (or centralised) vowels, the nonstandard phonetic form completely applies to the theory. However, in *ekt^{h}rōn* the nonstandard vowel is following /r/, which could still mean there is a carryover effect from the consonant environment on the vowel; but certainly the nasal is now neither having a raising effect on the vowel in any way.

Therefore, despite this rather complicated phonetic analysis, *ekt^{h}rōn* still looks more like a product of accidental case confusion than the other examples, albeit that phonology may have had a hand in the process. This example is within the texts of OGN I: 1-19, notes of something or other being transferred to various persons, all starting with the preposition πρὸς <pros> 'to', which agrees with accusative. The case inflection, however, is a highly varying one in these texts, and analysed by Leiwo to have a fairly even distribution among all the cases although an accusative is often selected for the first word (eleven out of nineteen cases (eighteen preserving the first word after the preposition) – after that, the next ones seem to have received a rather random treatment among nominative, accusative, genitive and dative (Leiwo 2003: 5-7). Therefore it seems likely that in this particular case we can safely assume that the nonstandard form is not based on the phonetic form, although it may have been involved in the subconscious writing process.

[46] Earlier periods are the only secure comparison as texts from the Hellenistic and Roman periods mostly come from Egypt, and there is therefore no certainty of the native language of Greek texts, even if they are of native-like quality.

Second, something that must again not be forgotten is the effect of stress. While the consonantal environment might be a strong factor behind this nonstandard production, in all of the examples the nonstandard vowel is also in the word-final unstressed syllable. Horrocks (2010: 112) says that /o/ changing to /u/ is typical of Greek used in Egypt due to Egyptian influence. This gives one explanation to why there was more case grammatical fluctuation in relation to the presence of the phonemes /o/ and /u/ in Greek in Egypt: regardless of whether there was loss of the word-final /n/ or /s/ in the Greek word, the quality of the rounded vowel was probably often also determined by whether it was stressed or unstressed in the Egyptian system. If it is, again, accepted that Egyptian stress mostly lies in the second syllable in trisyllabic words, the vowel variation in <Hermeinou> /herˈminu/ from the standard <Herminon> /herˈmino(n)/ makes sense from the same point of view, i.e. the unstressed final (round) vowel has been replaced with an appropriate one for an unstressed Egyptian syllable, from /o/ to /u/. The same applies for <Makrinou> (from the standard *Makrínō(i)*) and <Troeilou> (from *Trōílos*).

All of these nonstandard forms are possibly therefore also phonological in nature, not only subject to case confusion. In these examples, the unstressed syllable is that according to the Greek original system, but probably the same in Egyptian. Therefore these would be instances in which the stress systems coincided, leaving possible transference of the Egyptian stress unnoticed, or indeed, unnecessary (from the point of view of the Egyptian language user). Nevertheless, it seems likely that native language stress-related phoneme distribution might have been transferred to the second language use, and therefore the allophones of the native language unstressed vowels' inventory were used instead of the Greek original vowel qualities.

It might be noteworthy to here produce one of the (many) examples involving Greek unstressed /o/ that are written in the standard way, for example Ἐνπορος <enporos> from the standard Ἔμπορος <emporos> 'merchant' in OGN I: 30. Despite the <m> in the standard here being replaced with <n> (an apparent attempt to overly dissimilate the nasal from the following bilabial, perhaps in servitude of archaism), the two Greek nonstressed /o/'s have nevertheless managed to hold their position unlike in the examples presented in this chapter. There might, of course, be very simple reasons for this, for instance the scribe having learned this particular word by heart. However, I would like to point out that transfer of Egyptian stress might give the same outcome: if stress in Coptic was seen fit to lay on the second syllable, the scribe would have had no problem with the /o/ in that particular syllable, and word-final *-os* was so frequent in Greek (masculine) nouns and personal names that remembering that would surely have caused no troubles. This is one of the instances that might hide transfer of the Egyptian stress system as there was nothing wrong with the Greek original (apart from the obvious change of nasal graphemes). The possible transfer of Egyptian stress is further analysed in Section 5.1.6.

4.3.3 Greek phonological development in process and underdifferentiation of foreign phonemes: /i, e/

Variation between /i/ and /e/ is the most difficult subject in this analysis. It is the most salient aspect of the Greek vowel raising because *eta* and the diphthong ει <ei> eventually raised to /i/, and therefore variation between the various phonemes involved in this phenomenon is often taken to only concern the developments of Greek internal phonology. However, as the writers of OGN I were Egyptian, it must be taken into account that /i, e/ variation is also a significant feature of the Coptic phonological system, and could in some instances in these texts indicate transfer of Egyptian phonology on Greek.

A further point to consider is that there might be psycholinguistic reasons behind the Egyptian writers' confusion between Greek ε <e> and η <ē>, and ει <ei>. Having similar sounds in one's native language, the minimal differences might not get noticed, and the TL remains imperfectly learned. As mentioned before, the gross differences are perceptually more salient, and therefore receive the language learner's attention, resulting in better learning these foreign phonemes (Major 2001: 37). It is understandable that in case no serious misunderstandings will follow of confusing similar sounds with smaller differences, these will get less attention. This might be one of the reasons why the L1 Egyptian writers confused Greek ε <e> and η <ē> with each other even though there were two distinct /e/ phonemes in Coptic, an open and a closed one; it might also contribute to the fact why η <ē> /e/ and ι <i> /i/ were so often confused. With the raising of η <ē> to /ę/ when coming to the Roman period (Horrocks 2010: 167), the Greek front vowel inventory grew even larger compared with that of Egyptian. A clear distinction between [i] and [ę] was probably hard to sustain in unstressed syllables (Horrocks 2010: 168) even for native speakers, and for the Egyptian ear, probably even more difficult to perceive. It is therefore hardly surprising that the majority of these spelling errors occur in unstressed syllables. They have traditionally been seen as signs of Greek phonological development but Gignac suggested that *iotacism* was advanced in Egypt by the beginning of the Roman period due to underdifferentiation of Greek close front vowels (Gignac 1976: 235; 1991: 187). I suggest that the situation is not as simple as that, but that the famous Greek phenomenon caused by the language-internal phonological development is partly masking what is happening underneath the surface related to the partial substrate effect of Egyptian.

ε <e> and η <ē> interchanged sporadically (Threatte 1980: 159-164), after ca. 370 rarely and normally in the hands of inexperienced writers, growing more frequent in the Roman period, although the confusion was not seen as often as that of ο <o> and ω <ō> due to η <ē> eventually starting the raise toward /i/, which distinguished it from ε <e>. Similarly, interchange of η <ē> and ι <i> is rare in Attic inscriptions despite the high frequency of it in later periods in papyri (Threatte 1980: 165-170). Also confusion between ει <ei> and η <ē> is seldom seen in the inscriptions (Threatte 1980: 170-171). Generally speaking of *iotacism*, given the high frequency in papyri of all of the phonemes mentioned above being confused with one another, it can safely be said that this part of Greek phonological development belonged to the Roman period and later. It is the most extensive subgroup presenting nonstandard orthography and phonological differences in Greek texts from these periods, and therefore all the different phenomena are usually grouped together as simple cases of '*iotacism'*. Variation is abundant, and vividly present also in the ostraca from Narmouthis. It is represented on the one hand in the form of ι <i>/ει <ei> confusion, which is the most frequent one, and on the other hand in the η <ē>/ει <ei> confusion; sometimes even ε <e> and η <ē> are varied interchangeably, giving firm evidence of *eta* not having raised to /i/ in the period of this language analysis. From the point of view of the second language users, especially the minimal difference between precisely *eta* and *epsilon* could have made a difference as in Coptic, these graphemes had the phonetic values

of /e/ and /ɛ/, whereas in Greek they were /e/ and /ę/. In this section I present some possible cases of the broad spectrum of /i, e/ variation, starting with the variation between ει <ei> and ι <i>, the most frequently seen of all the possible phonetic variants of /i/.

4.3.3.1 Variation between ει <ei> and ι <i>

ει <ei>/ι <i> confusion is frequent in the Roman period due to /ei/ raising toward /i/; Gignac (1976: 189-191) lists ca. forty examples of this in the direction of ει <ei> to ι <i>, and over sixty examples of the reverse happening. These could be a result of hypercorrection, but there seems to be a correlation of especially ι <i> being relaced with ει <ei> within specific phonemic environments: it occurs adjacent to /m, n/, back vowels, liquids (/r/) and /s/. This could be a phonetic development related to the bilabials/nasals and liquids retracting the value of the close vowel to a close-mid one, in the way that /u/ to /o/ was retracted in the same environments in Sections 4.3.2.3 and 4.3.2.4. Equally, where this happens in the other direction, from /ei/ to /i/, it sometimes seems to result from erosion on more frequent lexica such as the personal pronoun εἰμί <eimi> and ὑμεῖς <hymeis> but in most other cases, the change occurs in the proximity of coronal consonants or other front consonants with the potential of causing vowel quality to raise. However, front consonant environments are also found in the other group of replacement of /ei/ with /i/, so there is not enough evidence to determine whether coarticulation might be a factor with this particular variation. Nevertheless, Gignac's examples are from the first three centuries through to a few later ones, ending in the sixth, so partly they co-occur with the dating of the Narmouthis ostraca, and Narmouthis ostraca display the same phenomenon within the exact same phonemic environments.

Narmouthis ostraca are early enough for the process of *iotacism* to be unfinished on all accounts, and this can even be seen in a number of writing forms that display variation between ει <ei> and η <ē> on the one hand, and η <ē> and ε <e> on the other. More importantly, even ει <ei>/ι <i> confusion, by far the most frequent one, seems to exhibit effect of consonantal environment on vowels, as analysed in Table 11 below.

OGN I	Variation	Phonetic process	Phonetic environment	Coarticulation?
22	Αντινοεις (Αντινοίς) <Antinoeis> (Antinois)	**retraction**	/o_s	/s/ (/o/)
30	Τροειλου (Τρωίλος) <Troeilou> (Trōilos)	**retraction**	/o_l	liquid (/o/)
70	ὀφίλων (ὀφείλων) <op^{h}ilōn> (<op^{h}eilōn>)	raising	/p^h_l	liquid? (/o/, bilabial)
72	χιρισμοῦ (χειρισμοῦ) <k^{h}irismou> (<k^{h}eirismou>)	raising	/k^h_r	liquid? (/i/)
73	προφητίας (προφητείας) <prop^{h}ētias> (<prop^{h}ēteias>)	raising	/t_a	coronal
74, 75	πλατῖας (πλατεῖας) <platias> (<plateias>)	raising	/t_a	coronal
77	ἀρκεσθὶς (ἀρκεσθείς) <askest^{h}is> (<askest^{h}eis>)	raising	/t^h_s	coronal
78	κατελθῖν (κατελθεῖν) <katelt^{h}in> (<katelt^{h}ein>)	raising	/t^h_n	coronal
79	Αλεξάνδριον (Ἀλεξάνδρειαν) <Alek^{s}andrion> (<Alek^{s}andreian>)	raising	/r_a (o < a)	liquid? (/d/)
79	ἀποδῖξε (ἀποδεῖξαι) <apodik^{s}e> (<apodeik^{s}ai>)	raising	/d_k^s	coronal

80	ἐλθῖν (ἐλθεῖν) <elt^{h}in> (<elt^{h}ein>)	raising	/t^h_n	coronal
82	φατρίους (φατρείους) <p^{h}atrious> (<p^{h}atreious>)	raising	/r_u	liquid? (/u/)
82	γίτωνος (γείτονες) <gitōnos> (<geitones>)	raising	/g_t	coronal
83	Ἀφροδείσ[[ο]]ι[ος] (Ἀφροδίσιος) <Ap^{h}rodeis[[o]]i[os]> (<Ap^{h}rodisios>)	**retraction**	/d_s	/s/ (/o/)
87	ἱερῖς (ἱερεῖς) <^{h}ieris> (<^{h}iereis>)	raising	/r_s	coronal?
87	λιτουρκῖν (λειτουργεῖν) <litourkin> (<leitourgein>)	raising	/k_n	coronal
90	δανιστὴς (δανειστής) <danistēs> (<daneistēs>)	raising	/n_s	coronal
91	ἐπιστῖλέ (ἐπιστεῖλαι) <epistile> (<episteilai>)	raising	/t_l	coronal
92	διασίν (διασείειν) <diasin> (<diaseiein>)	raising	/s_n	coronal
92	θρησκίας (θρησκείας) <t^{h}rēskias> (<t^{h}rēskeias>)	raising	/k_a	?
92	ὀφίλι (ὀφείλει) <op^{h}ili> (<op^{h}eilei>)	raising	/p^h_l, /l_	liquid? (bilabial)
93, 100	ἔχι (ἔχει) <ek^{h}i> (<ek^{h}ei>)	raising	/k^h_	?
93	περιέχι (περιέχει) <periek^{h}i> (<periek^{h}ei>)	raising	/k^h_	?
93	δανιστὴς (δανειστής) <danistēs> (<daneistēs>)	raising	/n_s	coronal
94, 95	χάρις (χάρεις) <k^{h}aris> (<k^{h}areis>)	raising	/r_s	liquid? (/s/)
100	Ἠσίου (Ἰσιείου) <Ēsiou> (<Isieiou>)	raising	/i_u	/i/, /u/
102	Νίλου (Νείλου) <Nilou> (<Neilou>)	raising	/n_l	coronal
102	δανίου (δανείου) <daniou> (<daneiou>)	raising	/n_u	coronal
103	ὀφίλει (ὀφείλει) <op^{h}ilei> (<op^{h}eilei>)	raising	/p^h_l	liquid? (bilabial)
104	Ἑρμείνου (Ἑρμῖνον) <^{h}Ermeinou> (<^{h}Erminon>)	**retraction**	/m_n	bilabial
110	μετροπόλι (μητροπόλει) <metropoli> (<mētropolei>)	raising	/l_	liquid?
114	γεινει (κίνει) <geinei> (<kinei>)	**retraction**	/g_n	coronal
115	ἐπὶ (ἐπεί) <epi> (<epei>)	raising	/p_	?
127	πήχις (πήχεις) <pēk^{h}is> (<pēk^{h}eis>)	raising	/k^h_s	?

Table 11. Variation between <ei> and <i>. The standard form is in parentheses.

As can be seen from the table above, /ei/ was at the time of OGN I if not fully merged with /i/, at least far along it. It is so frequent it is nearing a standard, and while it happens to co-occur adjacent to coronal consonants, which tend to front/raise vowel quality, in many cases, often there is nothing that would explain it in terms of phonetic environment, and many cases are definitely uncertain, albeit still narrowly explainable within coarticulatory effect. For instance OGN I: 70 ὀφίλων <ap^{h}ilōn> from the standard ὀφείλων <op^{h}eilōn> is surrounded by a bilabial

and a liquid. /l/ is a coronal consonant, and can therefore be responsible for raising the vowel quality in anticipatory gesture, preparing for a tongue tipped front production for it. This could take the preceding vowel's quality with it. But on the other hand, this liquid is preceded by a blilabial, which should be retracting the close vowels quality. Liquids tend to have a somewhat fluctuant phonetic value which allows for an easy assimilation with nearby phoneme qualities. The same applies to /s/, which can have a centralising effect on vowels. So, although both liquids /r, l/ and /s/ are coronals and could therefore have a fronting effect on the quality of the nearby vowels, they can just as easily retract the vowel quality if they are themselves affected by back phonemes.

Bilabials can retract close vowels' quality, but bilabials are front consonants, so perhaps that fact together with the following coronal /l/ is enough to raise the vowel quality. In OGN I: 92 θρησκίας <tʰrēskias> from the standard θρησκείας <tʰrēskeias>, however, /i/ is surrounded by /k/ and /a/ which should, if anything, have a retracting effect on the vowel quality. Therefore it seems that /ei/ was becoming /i/ at this time, possibly partly driven by the adjacency of coronal consonants. The only valuable piece of information in the interchanged usage of /ei, i/ is the occasional nonstandard writing of it in the less frequent direction, from standard ι <i> to ει <ei>. There are only four examples of this in the Narmouthis ostraca but they always occur in a phonetic environment that gives immediate explanation for the retraction: near bilabials (OGN I: 104), liquids with a preceding back phoneme (OGN I: 30), /s/ with a preceding back vowel (OGN I: 22, OGN I: 83), or nasals, which behave like bilabials in retracting close vowels and raising open ones, as explained in Section 4.3.2.4 (OGN I: 114). The discussion connected to these phonetic environments and /i/ being retracted to /ei/ will continue in Section 5.3, but for now suffice it to say that with ει <ei> /ei/ being also in variation with η <ē> /ę/ while the latter also varied with ε <e> /e/, it seems like adequate evidence of ει <ei> at this time still having a phonetic value close to /ę/. Horrocks (largely following Teodorsson 1977) gives this phonetic value to ει <ei> for the majority system of Egyptian Koine in mid-2nd century BCE, but only before vowels (Horrocks 2010: 167). This is a few centuries before the time of the Narmouthis ostraca. Either, then, the raising of /ei/ to /i/ should be pushed to a later period or it has to be considered to be a part of the language contact situation, i.e. Egyptian influence on the language learners' Greek.

4.3.3.2 Variation between ι <i>, ει <ei> and η <ē>

Besides varying with ι <i>, ει <ei> also varies with η <ē>. As well as the previous phoneme variation, this is equally frequent throughout Roman and Byzantine periods, starting from very early Roman times, 21 CE. Gignac specifically points out replacement of η <ē> with ει <ei> before back vowels, thereby indicating that *eta* had a lower quality than /ei/; at the same time, as with ι <i>/ει <ei> variation, other phoneme environments where this replacement takes place again include nasals, bilabials, liquids and /s/ (Gignac 1976: 239-242).

Stress position does not seem to make a difference in these instances, whether analysed by Greek stress rules or those available for Coptic; therefore it seems that unstressed or stressed, the coarticulatory effect in these particular instances was stronger than the effects of stress position on a vowel. Or, perhaps to put it another way, quality of /e/ was so weak that it was influenced regardless of the position related to stress. Variation between η <ē> and ι <i> was even more frequent (Gicnac 1976: 235-239) in all possible phonemic environments for η <ē> to ι <i> with only slightly more variation into the other direction with back phoneme adjacency; in fact, without variation between η <ē> and ε <e>, it would be very difficult to show any retaining of /e/ quality for *eta* and /ei/. But, as this existed in large enough quantities as well,

there is reason to believe that even raising of /ei/ was not complete at the time period of OGN I.

Below are examples from the Narmouthis ostraca displaying this phenomenon. Once again, this feature is present in a personal name, Ταουειτης <Taoueitēs> from the standard Ταουῆτις <Taouētis> (or Ταου(ε)ιτος <Taou(e)itos> and names can arguably say to reveal more of phonetic variation than common nouns as they often, especially when they belong to a foreign culture, lack standards in the transcriptional level and therefore tend to follow the reality of the spoken language in their spontaneous writing forms. However, the usage of the names precisely show evidence for the raising quality of *eta.*

In Ταουειτης <Taoueitēs> the standard η <ē> has been replaced with ει <ei>, showing a raised quality for /ei/. On the other hand, the final syllable of the same name contains a nonstandard η <ē> in the place of a standard ι <i>, evidence for a retracted quality for *eta.* If indeed the standard for this name was Ταουῆτις <Taouētis>, there is a perfect example here of the tendency for coarticulation to mostly be anticipatory as the vowel quality in both nonstandard cases has been changed to follow that of the following consonant. See Table 12 for the <i, ē, ei> /i, ę/ confusion in the Narmouthis ostraca.

Ostracon	**Variation**	**Phonetic process**	**Phonetic environment**	**Coarticulation?**
OGN I: 21	ξυλωπωλις (ξυλοπώλης) <k^{s}ylōpōlis> (<k^{s}ylopōlēs>)	raising	/l_s	liquid? (bilabial)
OGN I: 28	Ταουειτης (Ταουῆτις/Ταου(ε)ιτος) <Taoueitēs> (<Taou(e)itos/Taoueitēs>)	raising **retraction**	/u_t /t_s	/t/ /s/
OGN I: 60	‘ϊμισυνθης (ἡμισυνθέσεις) <^{h}imisynt^{h}ēs> (<^{h}ēmisynt^{h}eseis>)	raising	/#_m	/i/, /y/, coronals
OGN I: 91	ἡμένος (εἱμένος) <^{h}ēmenos> (<eimenos>)	**retraction**	/_m	bilabial
OGN I: 93	ἐπιτηρῆν (ἐπιτηρεῖν) <epitērēn> (<epitērein>)	**retraction**	/r_n	liquid? (/e/)

Table 12. Variation between <i>, <ē> and <e>.

The variation in these forms, even if there are not many nonstandard ones, reveals that *eta* indeed had a more retracted quality than /ei/ as the deviation from the standard form has taken place in phonetic environments that retract vowel quality: bilabial (as in ἡμένος <^{h}ēmenos> from the standard εἱμένος <eimenos>), /s/ in Ταουειτης <Taoueitēs>, and a liquid with a preceding vowel quality in which to assimilate, in this case the η <ē> /e/ in the second syllable of ἐπιτηρῆν <epitērēn> from the standard ἐπιτηρεῖν <epitērein>. On the other hand, in ξυλωπωλις <k^{s}ylōpōlis> from the standard <k^{s}ylopōlēs> the vowel quality has raised, possibly due to the effect of the bilabial in the preceding syllable, and raising has also occurred in ‘ϊμισυνθης <^{h}imisynt^{h}ēs> from the standard ἡμισυνθέσεις <^{h}ēmisynt^{h}eseis>, perhaps because of the many front vowels and consonants in the following syllables - /i/, /y/, /n/, /t^{h}/ - quite likely the reason for the raising of *epsilon* to *eta* as well. Generally speaking, there are very few instances in the Narmouthis ostraca for *eta* to have been replaced with <i>. From the evidence available, it does seem that the quality of η <ē> should for at least the early Roman period be considered [e], as has done Leppänen (2016: 106-108) based on his studies on Gothic/Greek bilingual usage.

4.3.3.3 Variation between η <ē> and ε <e>

Variation between η <ē> and ε <e> occurs in the same environments as do the previous vowel changes, i.e. again near bilabials/nasals (/m/ classifies as both), /s/, liquids and interestingly, word-finally, which is probably indicative of a phonetic-level schwa. This consonantal articulation is especially clear in the cases where *eta* is what seems to be retracted to *epsilon.* Again, variation occurs both in Greek stressed and unstressed syllables.

There is also replacement by *epsilon* to *eta* even before back vowels and the consonantal environments supposed to cause retraction from as early on as the first century CE, so what is most important here is that the variation is within these consonantal environments in both directions, i.e. judging from this, one could not tell which of these phonemes is more raised, even if retraction occurs in almost exclusively in these environments and raisin to *eta* includes also coronals, which could explain some of the variation in this direction. All things considered, this must mean that *eta* was in the process of raising but still largely considered /e/, perhaps not yet even /ę/. The time scale of Gignac's examples range from 8 BCE (one example) to as late as the 7th, where mostly *eta* displays a raised quality in all phonetic environments. Most of the variation with a retraction from *eta* to *epsilon* is between the first century and the 5th/6th, mostly in 4th/5th. (Gignac 1976: 242-246).

Narmouthis ostraca are relatively early compared to Gignac's findings, so it is not surprising that this type of variation exists in the corpus. Below are some examples of this in Table 13.

OGN I	**Variation**	**Phonetic process**	**Phonetic environment**	**Coarticulation?**
21	Τεειεως (Τεειηους) <Teeieōs> (<Teeiēous>)	**retraction**	/i_o	/o/ (/e/)
60	‘ϊμισυνθης (ήμισυνθέσεις) <ʰimisyntʰēs> (<ʰēmisyntʰeseis>)	raising	/tʰ_s	coronal
67	Ήρμα (Ἑρμᾶς) <ʰĒrma> (<ʰErmas>)	raising	/_r	liquid? (/~~m/, /a/~~)
72	Ταακηους (Ταακέους) <Taakēous> (<Taakeous>)	raising	/k_u	/u/?
91	ελιπη < ἐλλιπές <elipē> (<ellipes>)	raising	/p_	bilabial? (/i/)
107	νεμεσετα (νεμεσητά) <nemeseta> (<nemesēta>)	**retraction**	/s_t	/s/
110	μετροπολι (μητροπόλει) <metropoli> (<mētropolei>)	**retraction**	/m_t	bilabial

Table 13. Variation between <ē> and <e>.

There are some names which display this particular variation, not surprisingly as names have not got standards comparable to common nouns, as discussed in Chapter 4 (introduction), and can therefore often start showing phonological developments sooner. Τεειεως <Teeieōs> from the standard Τεειηους <Teeiēous> has retraction in the phonemic environment expected, but Ήρμᾶ <ʰĒrma> from Ἑρμᾶς <ʰErmas> and Ταακήους <Taakēous> from Ταακέους <Taakeous> have variation in the other direction, raising, in a phonemic variation that would give phonetic possibilities for retraction. For example, Ηρμᾶ <ʰĒrma> is followed by a liquid /r/ with a further following bilabial and a back vowel to drag the quality of the liquid backward

as explained in Section 4.3.2.4, but the standard ε <e> /e/ is still raised to η <ē> /ę/. The nonstandard forms of these two names could therefore be seen as an early sign of the phonological process of *eta* raising being in process. In all other forms, the phonetic environments can explain the nonstandard variation, as in ελιπὴ <elipē> from ἐλλιπές <ellipes>, in which I believe the quality of the vowel has raised regardless of the preceding bilabial, or η <ē> is simply a graphic variant for a word-final schwa-depicting ε <e>.

4.3.3.4 Variation between ε <e> and υ <y>

Unlike the admittedly confusing variation between ει <ei>, η <ē> and ι <i>, some of the variation is definitely not typical of native language writers. Variation between *epsilon* and *ypsilon* is a good example of this type, because these phonemes are still distinct in Modern Greek. Gignac reports incidents from Greek papyri as late as the 7th century of this happening, mostly in unstressed syllables, but also in stressed ones; when it happens in stressed syllables, it almost exclusively takes place before back vowels, nasals or /s/. This is exactly the same positions in which there seems to be coarticulatory effect from consonants to vowels within the variation between /e/ and /i/, explained in the next section. According to Gignac, this form of variation is related to Egyptian influence and is indicative of vowel reduction to schwa in unstressed syllables. Gicnac also notes that the phenomenon is paralleled in Greek loanwords in Coptic. (Gicnac 1976: 273-275).

Threatte (1980: 267) reports only one case of confusion between /y/ and /e/ that can be seen as anything more than a graphic mistake: the writer has written Εὐθεμένης <Eut^{h}emenēs> for the more common Εὐθυμένης <Eut^{h}ymenēs>. Also attestations for the interchange between η <ē> and υ <y> are according to Threatte graphic mistakes; the period is a few hundred years prior to that of the texts in Roman Egypt, so evidently, the raising of /e:/, nor /y/, to /i/ had not begun yet. There are no examples in the Narmouthis Greek ostraca of this phenomenon, but I will return to it in Chapter 5.1 with Greek loanwords in Coptic, and in 5.3 with other Greek material from Egypt.

4.3.4 Bivalency of Coptic *eta*

The uncertainty in the marking of Greek /i/ and /e/ shown in the previous section might have something to do with the bivalency of Coptic *eta*, which frequently had two graphemic variants in foreign language transcriptions, i.e. <i> and <a>. In this section I go through some of the research around this topic, and again introduce my own idea concerning the effect of consonantal coarticulation on Coptic vowel qualities, and henceforth on Greek nonstandard vowel usage by Egyptian writers through phonological transfer from the native language.

As mentioned before, I follow the quality hypothesis regarding the Coptic vowels, not that of quantity. In other words, I believe that Coptic *eta* had the phonetic quality of [e] and Coptic *epsilon* was phonetically [ɛ]. Bearing this in mind, I believe that these two closely articulated phonemes might partly share the same phenomenon that has been brought forward by Coptologists as solely concerning *eta,* i.e. having allophonic variants in and between /i/ and /a/, albeit that in the case of *epsilon* restricted to the lower part of the continuum, varying with [e, ɛ, æ, a]. I also believe the same to apply to the depictions of <i>, similarly sometimes gaining nonstandard phonetic variants in coarticulation. Mostly this happened with /e/, this being the nearest phoneme available for retraction, but sometimes also with /a/.

Lambdin (1958) sums up the research before his own contribution to the subject. There are cuneiform transcriptions from Amarna and Boğazkale that seem to indicate that Coptic *eta* is in certain instances a reflection of the long vowel *ū* in Late Egyptian,[47] therefore deriving from the two sources, the original *ē* as well as *ū*. Further support on this theory was found when Worrell and Vycichl published reports of the 'Popular Traditions of the Coptic language', which confirmed the existence of two separate phonemes being written with *eta* (Lambdin 1958: 179). The study and its result related to the quality of *eta* are explained below in more detail.[48]

Coptic Detail: Popular Traditions of Coptic and the quality of Coptic eta

The Popular Coptic Tradition studied by Worrell and Vycichl[49] concerns the Coptic variety found in Upper Egypt and more precisely Zēnīya, a village near Luxor that still at the end of the 19th century had some Coptic speakers following the "old pronunciation". This means that the village people pronounced Coptic approximately according to the phonological system of the ca. 1000 CE stage of the language, i.e. the original (Bohairic) Coptic,[50] unlike the "reformed" pronunciation carrying the Modern Greek phonetic values that was introduced in the Coptic Church revitalisation efforts. According to Worrell, the older pronunciation style was considered a language of the ignorant peasants. The Coptic variety used in Zēnīya, the nearest to the original pronunciation, was arabicised and conventionalised, but still within the scope of being a spoken language, i.e. tied to family tradition and related to the community and church use, with children still being taught Coptic. Therefore, even though it was no longer the same stage of Coptic as used for analyses in this work, it can still be considered to have been a living language, albeit that contact with Arabic was extensive. In the examples provided, Worrell gives the phonetic values [a, ɛ, e, i] for *eta* but it is

[47] Lambdin and Worrell use the term 'New Egyptian' for this stage of the language.

[48] The study has been seriously questioned by Peust (1999: 228-230; cf. also Richter 2009: 423-424) because, first of all, it is not known how the words used as examples were elicited. However, they fit with the general continuum of the research of Coptic *eta* so despite these doubts, I have decided to use them here as examples of the phenomenon.

[49] There are two versions of Worrell presenting this research. The first one (1937) was an article by Worrell, and the second (1942) was a book chapter written by Worrell, but with a co-author credit to Vycichl because the corpus had been collected by him and partly analysed together (Worrell & Vycichl 1942: 297). I have mostly used the (1937) article for my analysis because the linguistic traits discussed in this section are described in a more compact way in it.

[50] Zēnīya Copts even made words for some new things introduced to their lives, for example coffee, tobacco, and tea, by the usual methods of word borrowing and translation (Worrell & Vycichl 1942: 306-308). Therefore at least on an ideological level the Zēnīya variety was treated similarly to a native language, and apparently there were some people who spoke it close to a native language level (although very limited in number). Mostly the villagers who spoke it did not know how to write Coptic and their knowledge of it was meagre, but it was still taught to them by imported priests and teachers from other regions, and spoken after church in a manner reminiscent of a hobby; even children wanted to learn this "secret" language (Worrell & Vycichl 1942: 299-304). The Zēnīya only know the Bohairic variety of Coptic, and Bohairic never became the vernacular near Luxor; indeed, there were still some Sahidic elements in the speech of the Zēnīya Copts. It therefore seems that the language variety spoken in the village was based on the language of the church introduced in the 11th century, which is also the period in which Coptic apparently ceased to be used as a native language and treatises began to be composed in Arabic (Worrell 1937: 2; Worrell & Vycichl 1942: 306). The Coptic Church (still) uses the Bohairic dialect.

noteworthy that he also gives a phonetic transcription for *epsilon* having been pronounced as [a, ɛ] and [æ]; *epsilon*, however, is never confused with /i/.[51]

The most frequent one of these variants and the one considered by Worrell to have been nearest to the standard seems to be [a/aː]; he also states that the qualitative i.e. stative form of every biconsonantal verb is pronounced with [aː]. Generally this phonemic feature was at the time considered to be Arabic influence but according to Worrell it is not; according to him this has been the phonetic quality of *eta* since ca. 1000 CE, and apparently the remnant of the Egyptian original /u/. This Egyptian original /u/ had according to Worrell in early Coptic developed to /y/ or /ø/, and in later Coptic (the one discussed in his study) further developed and pronounced [a]. Worrell believes that there was an unrounded counterpart for this, [iː] or [eː], also marked graphemically with *eta*. In his opinion, the original phonetic value in early Coptic for *eta* was [eː] rather than [iː] because *eta* is not usually confused with /i/. It is true that even in relatively late Coptic, native language words as well as Greek loanwords carry variation between *eta* and *epsilon*, so there seem to be some grounds for suspecting an original /e/ value for *eta* in Coptic. Be that as it may, having two allophonic variants both written with *eta* would certainly explain the pronouncing of *eta* sometimes as [a] and other times as [i]. Sometimes the informants, on delivering samples of the Coptic they spoke, corrected themselves from pronouncing *eta* as /e/, and produced the word again with /a/, such as in ⲭⲏⲙⲓ <kēmi> 'Egypt' being first pronounced *kēmi* and then immediately replaced with *kāmi*.

Worrell suspects an Arabic background for the variation. This might be true, but it is not necessarily the only available explanation for the variation. On the other hand, Worrell mentions coarticulation in relation to the vowel quantity hypothesis (following Vycichl) as a factor behind some of the variation. In his opinion, there were two variants for /e/ and /o/, a close one [o] near front consonants (such as /j/ and /w/) and an open one [ɔ] used with back consonants (such as /ħ/, a voiceless pharyngeal fricative). Likewise, there were an open [ɛ] and a close [e] treated along the same principles). Coarticulation could also explain much of the variation regarding *eta* having been pronounced between /a/ and /i/. In many cases the presumably nonstandard /i/ is surrounded by consonants that have the ability to raise (open) vowel quality in such environments, such as coronals (/t/, /l/), labials (/f/, /m/) and nasals (/n/); once again, closeness to /r/ gives conflicting results. There are some cues to why the variation might be phonetically motivated: intermediate stages of the variation were sometimes produced, i.e. phonemes in between the stretch of /a/ to /i/. Such instances were e.g. ⲧⲏ <tē> pronounced as *dæ* and ⲥⲙⲏ <smē> as (according to Worrell) either *isme* or *ismæ* (the prothetic vowel syllable-initially is a Bohairic feature, and also present in Arabic).

The representatives of old Coptic [ɛ] and/or [e] are parts of this continuum. If there was a process of sound change going on, causing *eta* to raise toward /i/, it seems likely that the first instances of it would have appeared at phonetically vulnerable environments, i.e. near consonants with ability to raise the vowel quality. Even without an on-going sound change these contexts would be likely to produce nonstandard variants in speech. Regarding this aspect, it is interesting that according to Worrell, old transliterations of *eta* usually give /a/ as its phonemic value, except in names of persons and places. The lesser level of standard regarding names has already been discussed in Section 4.1, and is also relevant here. Lacking standard orthography, the

[51] Some of these include examples where a syllable with an unstressed /e/ marked with *epsilon* has been made artificially stressed to distinguish it from other similar words without the stressed vowel.

> phonetic reality surfaces and language users start speaking and writing in the most phonetically transparent way instead of following the standard form out of habit and/or education. This seems to be what also happened here, and again the nonstandard variants give additional information on the phonetic phenomenon at hand. (Worrell 1937: 1-7).

Lambdin (1958: 179-180) disagrees with Worrell about the qualitative of biconsonantal verbs with a written *eta* having always been pronounced [aː] as there are occurrences where it is clearly transcribed with <i>. Again, many of the surrounding phonemes in the examples Lambdin gives have the ability to raise vowel quality: the vowel in the nonstandard forms mostly rests in between labials and /r/, apart from one word, кн <kē>. If the rules of Arabic phonology are applied (more on this in Section 5.2), even /k/ has the ability to raise vowel quality. On the other hand, Lambdin is confident based on the results of his own very complicated etymological studies that Late Egyptian /u/ became to be marked with *eta* in Coptic. In the four major dialects, Sahidic, Bohairic, Achmimic and Fayyumic, there are contrastive differences between *eta*, *epsilon* and *iota* in the orthography of the same words so Lambdin marks *iota* as an allophone to *eta*, especially adjacent to /r/ (Lambdin 1958: 185-187).

The possible effect of coarticulation as a reason behind the nonstandard variation (under the theory of the standard vowel being /a/) and the phonemic environments involved in the examples where the vowel quality has raised give grounds to suspect that Arabic influence might have been a bigger factor than anticipated by Worrell – Egypt and the last remaining Coptic speakers were bilingual, and Coptic was subject to language attrition. On the other hand, the phonetic spellings need not necessarily have an Arabic background because similar type of coarticulatorily-based variation is present already in earlier Coptic texts when writing nonstandard forms of Greek loanwords, the standard orthographic form either forgotten or in an attempt to integrate the foreign word into the native language. Furthermore, taking into account the linguistic structure of Egyptian with its heavy tendency for consonantal coarticulation, such variation is also present in many Greek texts written by Egyptian writers.

Henceforth, even though taking phonetic coarticulation into account is an actual part of Arabic phonology, it was quite clearly also a tendency for Egyptian. As in the Greek used by L1 Egyptians, some features of Coptic morphology might have been better remembered than others, and those that were not, might have been treated phonetically and written accordingly. Coarticulation as the motive behind these forms seems to be proven with the word мнϣ <mēs^{h}> 'crowd, throng', as it has nine occurrences in the transcriptions and two of these have /iː/ as the vowel, two have /aː/, and the remaining five show intermediate stages with /eː/ and /æ/. It is known from cuneiform scripts that in Late Egyptian, the vowel for this word was /i/. If we think about the effect of coarticulation, the situation seems quite clear: the labial has retracted the close vowel's quality. Nevertheless, even Lambdin agrees that even though the etymological Egyptian /u/ retains a double value for *eta* in Coptic, /aː/ is the general outcome of this.

Peust (1999: 228-230) agrees only on the most prominent part of the researches presented by Worrell & Vycichl and Lambdin, respectively. This is the simple fact that *eta* had two pronunciations. According to the researches mentioned above these were possibly deriving from two different sources: one representing the etymological Egyptian /u/, in Coptic /øː/, and in Late Egyptian (that of the Zēnīya Copts) developed into [aː], and one representing etymological Egyptian /i/, in Coptic pronounced /eː/, and in Late Egyptian again raised and pronounced [iː]. However, on this account, Peust makes an important point that should be noted here especially since the subject of my study concerns the nonstandard variants in Greek written by Egyptian speakers. As Peust points out, the same phenomenon appears in Greek loanwords, namely *eta* having the phonemic qualities of /i/ and /a/. Therefore it seems unlikely that the

cause for this should lie in Egyptian etymological processes. Like myself, Peust believes the variation to be phonetically conditioned, not related to a phonological opposition. He offers evidence in the form of ca. 200 Late Egyptian words with *eta* that seems to suggest that /a/ was in fact the 'default' phoneme with allophonic variation occurring with /i/ where consonantal environment caused it. For example, Peust says that monosyllabic words were realised as /a/, regardless of them being stressed (therefore eliminating the possibility of <a> representing schwa). Examples are native Coptic words such as ⲙⲏⲓ <mēi>, ⲛⲏⲃ <nēb>, ϩⲏⲃ <hēb>, and ⲧⲏⲣϥ <tērf>. The first three of these have bilabials and nasals in the proximity of the vowel, and these have the ability to lower the quality of a close vowel, as discussed before. The fourth one is again related to the unclear picture of the effect of liquids on vowels in Coptic; presumably they mostly follow the phonemic surroundings, which in this case do not give cause to retract vowel quality, unless the labial /f/ at the very end of the word is sufficient reason for anticipatory coarticulation.

According to Peust, also polysyllabic native Coptic words with word-final *eta* usually tend to have [a]; again, the example words have consonantal surroundings also seen capable of retracting close vowel quality related to the confusion of /i, e/; /s/, liquids, and nasals. On the other hand, Greek loanwords display variation between /i/ and /a/ without any clear symmetry. Interestingly, the treatment of non-final *eta* is divided between native Coptic words and Greek loanwords in the way that the Coptic ones are pronounced with [a] and Greek ones mostly with [i]. In some cases, variation seems to be targeted for vowel dissimilation in order to better perceive distinct vowel qualities; therefore, *eta* might have received the phonetic value of [a] if there was an /i/ in the previous syllable. This principle seems to be behind some of the wild variation in Greek loanwords: for example in ⲉⲕⲕⲗⲏⲥⲓⲁ <ekklēsia> *eta* was sometimes pronounced as [a] and sometimes as [i] because of the apparently Coptic desire to create dissimilative distinction between the phonemes, and on the other hand sometimes being written faithfully to its contemporary Greek pronunciation. It seems evident that because the period of Peust's example material is a late one, Greek vowel raising was finalised and *eta* was in Greek pronounced [i]. This was known and repeated in Greek loanwords. In general, Peust does not believe stress to be of relevance here, and neither do I. Rather, I think coarticulation was far more pressing a factor behind some of the nonstandard forms. Peust believes that it might be possible that *eta* was originally pronounced [i] in unstressed syllables and [a] in stressed ones (Peust 1999: 229-230). This seems like a reasonable opinion based on the fact that /i/ is more likely to preserve its distinctive quality in unstressed syllables, whereas /a/ might get centralised to schwa. However, following Peust's examples of the display of *eta* in loanwords (from Coptic and Greek) and place names in Modern Arabic (Peust 1999: 230), it seems most likely that coarticulation was the main motive for this variation: *eta* is most faithfully represented with <i> near consonants that typically raise vowel value in Arabic, and likewise with <a> adjacent to e.g. /r/ that normally retracts vowel quality in Modern Standard Arabic. Although the words are quite heavily modified to fit Arabic phonological rules in terms of e.g. syllable structure, the same divide between written *eta* being pronounced as [i] in Greek loanwords and [a] in most Coptic ones is evident. Therefore the phonetic form is not only based on integration into Arabic phonology but also phonetic processes within the donor languages. For instance ⲙⲉⲥⲟⲣⲏ <mesorē>, the 12th month of the Coptic year, is in Arabic /ˈmisra/. (Peust 1999: 229-230).[52]

The word-final *eta*, therefore, being written with <a> in Arabic could be the result of the Coptic tendency for this mentioned above, or the result of the Modern Arabic phonological rule

[52] It should be noted here that Peust is discussing this in terms of the phonemic level, not the written one – as much as Arabic does not write other vowels than /a, i, u/, positional allophones of these exist on the level of spoken language. Peust does not give a phonetic level so these allophones can not be seen; the point, however, is not in the exact representation of the phonetic realisation of the former *eta* in Arabic but the adaptation of it to the consonantal environment, i.e. whether it is retracted (/a/) or fronted (/i/).

according to which /r/ retracts vowel quality. It must not be overlooked that also the Coptic original *epsilon* has received another quality in the Arabic rendering of the word – it has been replaced with /i/. This can similarly be the result of either treatment, Coptic original or Arabic, as in Arabic /m/ can raise open vowel quality, and this seems to be the case in languages in general, so it could have been a part of the Coptic original word, although instances where *epsilon* was replaced with more closed variants seem to have been rare.

All of that presented above is in reasonable agreement with Gignac's phonological presentation of the Bohairic Coptic dialect (Gignac 1976: 331-332), the dialect used as Late Egyptian, and the one e.g. Zēnīya Copts mainly spoke. According to Gignac, *eta* had /i/ as allophone within the group of long stressed vowels, and in the same group, *epsilon* had *eta* as allophone. Within the short stressed vowels, however, the allophone of *eta* was /a/, while *epsilon* could have either /a/ or *eta* as allophones. Gignac follows the quantity hypothesis in his analysis of Coptic phonology while Worrell (and Vycichl) followed that of quality. However, the late period of Coptic which the analysis of the bivalent *eta* mainly concerns must be taken into account. It does not seem unfeasible that like Greek, Coptic might once have had quantity distinctions, but with the progress of the language to (even) more stress-timed (see e.g. Depuydt (1993) for this, as discussed in section 4.3.2.3), the quantity differences might have been lost and been replaced with quality differences. It seems that the principle according to the exact phonetic realisation of schwa might be applied here to have a better understanding of the situation.

If it is assumed that quantity was lost and replaced with quality, the stressed vowel groups must have merged, and both acted as realisations of *eta*. The shorter the vowel quantity, the more vulnerable it is to the features of the adjacent consonants, as discussed in Section 4.3.2.3. Therefore the quality of the vowel was probably determined in many cases by the quality of the nearby consonants, leading to the close/open variant dichotomy. A larger study should be conducted to be able to judge for the relevance of stress, but it does seem clear from all of the research relating to the subject that mostly the value allotted to *eta* in Coptic was [a]. Horrocks (2010: 112) mentioned that the quality of the Greek diphthong /ai/ seems to have been more retracted in Greek in Egypt than elsewhere in Koine, and perhaps the situation with *eta* goes toward proving this.

/ai/ was generally pronounced [e] but in Egypt it had more retracted variants along the continuum [ɛ~æ~a] judging by the fact that it had written variants with ⲁ <a> and ⲉ <e>. In other words, in Egypt everything from /i/ to /a/ varied within the front axis, accommodating to the pressure from surrounding consonants. Allowing for this hypothesis would certainly explain why it seems that /a/ was the standard phoneme for *eta* within the language production of the Zēnīya; all other front phonemes apart from /i/ seem to have preferred a retracted quality in Coptic.

Gignac (1976: 261-262) provides supporting evidence on the phenomenon discussed here, remarking on very frequent variation between <i>, <ei>, <e> and <ē> in papyri, vowel quality being dictated by the phonetic environment. Once again, then, it seems evident that there was consonantal coarticulation on vowel qualities, which probably was at least perceived, if not produced, more sensitively by L1 Egyptians using L2 Greek. Even though there are no variants in Narmouthis ostraca following the system in Coptic for realising *eta* as /i/ near front phonemes and as /a/ in back ones, this quality of Coptic *eta* must have been behind the nonstandard usage and variation of /i, ei, ẹ, e/ in the Narmouthis ostraca that was analysed in the previous section – the whole continuum between the phonemes /i/ and /a/ was weak and susceptible to the variation offered by (mostly) consonant quality. *Eta* and *epsilon* were frequently confused with one another so they were clearly very close in value, certainly in Greek at this time when vowel quantity was already lost but perhaps the raising of *eta* had not yet begun, but also in Coptic. In other words, even though the bivalency of Coptic *eta* strictly speaking concerns the realisation

of *eta* <ē> as <i> or <a> following Coptic phonological processes, it can be applied in the analysis of Narmouthis Greek nonstandard variants as <ē> and <e> were phonetically found so similar in quality to each other that they were nonstandardly replaced by one another, in Narmouthis Greek ostraca as well as in Coptic native language usage.

The bivalency of Coptic *eta* also relates to the confusion of (word-final) /a, e, o/ discussed in Section 4.3.1. Worrell and Vycichl (Worrell 1937: 7) seem to have believed there to have been a mostly formal reason based on etymological reasons behind the variation, i.e. /a/ being the default standard outcome of the etymological /u/, and when there was deviation of this to /i/, the nonstandard outcome would have resulted because a different grammatical function was intended. For instance, there is the case of the place name *Bāwīṭ* from (Sahidic) ⲡⲁⲩⲏⲧ <pauēt>, meant to be functionally a qualitative (i.e. stative). However, if the formation was the qualitative of *ʾwd* 'to separate' i.e. 'claustrum', as is presumed, it should be *b-awād*, not *b-awīd*. From this Vycichl deduced that the form must morphologically be a passive participle, because passive participles contain an /i/ element, whereas statives are formed with /a/ (Worrell 1937: 7; Worrell & Vycichl 1942: 316; the spelling occurs in BMC No. 872, note 1; see Loprieno 1995: 87-88 for passive participle formation). In addition, a qualitative could never be nominalised by an article, neither in Coptic nor in earlier Egyptian (Sebastian Richter, p.c.). Whether the grammatical aspect was actually known to these late speakers of Coptic, for whom it was not a first language nor a particularly efficiently taught one as described by Worrell & Vycichl (1942: 298-304), is another matter altogether; they could have worked on a level of remembering the forms by heart. It might be considered that the situation could be comparable to the apparently nonstandard verb inflection of Greek verbs by Egyptian scribes, for instance in the material of *O.Claud*. analysed by Leiwo (2010). In the *O.Claud*. ostraca the exact form of the verb is often uncertain, whether it is infinitive or imperative, because of the phonetically-based spellings of it by the writer (the nonstandard features are briefly described in Section 5.3). I suggest that instead of morphological confusion, the Coptic forms mentioned above could be based on a phonetic reality that only makes the surface form look morphologically specific. In other words, it is entirely possible that no particular form was intended, but coarticulatory processes raised the vowel quality in the formation of it to /i/ - the difference between the morphological forms might even not have been known.

Behind the Arabic form *Bāwīṭ* is the Coptic phonetic form *bawīd* (or *bawid* following the vowel quality hypothesis), which has the raised allophone /i/ of written *eta* because the vowel is surrounded by consonants that are likely to raise vowel quality: a labial (voiced labio-velar glide) /w/ and a coronal (voiced alveolar stop) /d/. As Worrell (1937: 5) says, old transliterations usually mark *eta* with <ā>, possibly based on *imala*, except in names. This seems like there was a standard that was followed even after possible sound changes, and these, as previously mentioned, might show in less-standardised contexts such as names. The situation is highly reminiscent of the confusion between /o/ and /e/ (phonetically /ə/) described in Section 4.3.1.1. Similarly to the examples presented in that section with orthographic variation between especially word-final and usually unstressed /a, e, o/, there is apparently phonetic confusion here with word-final (albeit stressed) /a/ and /i/ which are allophones of former /e/, still in phonetically conditioned variation with the whole spectre of [i, e, ɛ, æ, a] as late as the stage of 11th century Coptic, the variety the Zēnīya Copts (allegedly) spoke.

Conclusions for Chapter 4

In this chapter I have analysed the nonstandard vowel usage of the Greek in OGN I. The variation seems to be three-fold: the first phenomenon addressed is the reduction of word-final vowels, often unstressed. However, there are indicators of transfer of the Egyptian stress system

when the Greek one does not match the prosodic rules of the L1 of the scribes, so in some cases vowel reduction can also happen to Greek stressed vowels, treated according to Egyptian stress rules as unstressed. This type of variation concerns the confusion of especially /a, e, o/, related also to the fact that no Coptic dialect had more than two phonemes corresponding to the three Greek phonemes represented by the graphemes α, ε, ο <a, e, o> (Gignac 1991: 187). Because of this, there was evident underdifferentiation of vowel quality involved. As as result, e.g. Greek mood distinctions could be lost under this transfer effect.

Furthermore, another feature not as often seen but even more notable is the underdifferentiation of Greek /y/ as /u/ because there was no /y/ in (Coptic-)Egyptian. This feature, however, is largely connected to the early Roman period due to Greek internal phonological developments: quite simply, the vowel quality /y/ was lost in Greek because it eventually raised to /i/. Therefore the nonstandard usage of Greek /y/ as /u/ is somewhat indicative of the first stages of societal bilingualism, before e.g. often used administrative terms stabilised from native language phonologically integrated forms to more faithful productions following the phonology of the second language.

Another feature related to the Greek round vowels is the frequent confusion of /o, u/. This was related to Coptic stress-related phoneme distribution and realised in relevant positions also in L2 Greek. Sometimes, however, it is not clear whether the variant is phonological or morphological, a topic which deserves more research. Although it is entirely possible that all of the nonstandard forms mentioned in this chapter are caused by the confusion of cases, it is more likely that in part they are caused by the Greek internal case syncretism and in part by the imperfect learning of the case system by the second language users. Nevertheless, it seems likely that all examples had a strong phonological hand involved in the scribe's mind when he produced the forms. Particularly the names involving nasals or a liquid seem to have enough evidence behind them to allow for a strong suspicion of an almost conclusively phonetic basis for these nonstandard forms: as discussed in this chapter, names are especially susceptible for phonological processes. However, case confusion in general and in OGN I in particular was so frequent in Greek texts in Egypt for language contact apparent reasons that nothing more certain than this can be said of these forms without interviewing the language users, which of course is no longer possible.

Finally, I touched upon the subject of /i, e/ confusion, the most frequent and most likely to be solely related to the process of Greek vowel raising. However, there are indications of an extremely flux character of the whole continuum from close to open front vowels in Coptic that might be at work here as well. The vowel quality follows that of the adjacent consonant, exactly as it does related to the bivalent quality of Coptic *eta.* Therefore, it seems that even this feature of the Greek spoken in Egypt is strongly related to the impact of Egyptian.

PART III: PHONOLOGICAL ANALYSIS OF THE COMPARATIVE MATERIAL

5. Supporting evidence for Egyptian influence

In this chapter I make comparisons between the nonstandard spellings in OGN I and nonstandard spellings of Greek loanwords in Coptic, which display similar phonological and phonetic variation based on the impact of Coptic. To confirm that the nonstandard phonemes are a part of the Coptic phonological system and not the result of Greek internal phonological development, I compare the nonstandard vowel usage present in Greek loanwords in Coptic texts to similar variation regarding Arabic loanwords in them. Arabic loanwords are treated within the same phonological rules of Coptic as the Greek ones so variation is largely of the same type: reduction of unstressed syllables and Coptic phonemic distribution related to the stress position of the vowels. Last, I take a look at Greek usage in Egypt more generally to see whether the same phonological motives are at work in Greek usage in Egypt more broadly.

5.1 Greek loanwords in Coptic

As already stated by Gignac (1991), the vast amount of variation and phonetic spellings in Greek texts in Egypt does amount to more than Greek phonological developments: there are clear indicators of Egyptian phonological influence at play. Among some of these features, Gignac mentions the already mentioned interchangeability of voiced and voiceless stops, which he says is only found in Egypt to an extensive degree, and is paralleled in Greek loanwords in Coptic.

W.A. Girgis wrote a PhD thesis at the University of Manchester titled *Greek words in Coptic Usage* (1955), later published as eight consecutive articles in the *Bulletin de la Société d'archéologie copte* (BSAC).[53] This article series was called *Greek loan words in Coptic,* from 1964-2001, and is the first large scale investigation to the Greek loanword usage in Coptic, and still a very valid source especially concerning phonology. The second part deals with vowel quality and is the one cited in this work. Girgis comments that most of the misspellings of Greek occur with scribes who were less trained in Greek, and consequently spelled the words as they were accustomed to hearing and speaking them, i.e. taking no notice of the grapheme-phoneme irregularities caused by Greek phonological development. According to Girgis information on Greek pronunciation can be attained through nonstandard writing forms, but he restricts this to information on how the Copts at a given time and place pronounced Greek – that is, that this is not necessarily the same as the native language users' pronunciation. Furthermore, Girgis takes it as natural that pronunciation of Greek would have been assimilated to the phonetic system of Coptic, concluding that in the end what can be learned from studying nonstandard Greek usage is a sense of "general Greek pronunciation which was common in Egypt in Coptic times". (Girgis 1966: 1971-72).

Greek loanwords in Coptic show similar nonstandard graphemic alteration regarding Greek phonemes as the Greek texts in OGN I. Variation is similar in all forms investigated in

[53] These separate articles are now reunited in a monograph: Girgis, W.A. [Anba Gregorios]. 2010. *Greek Words in Coptic Usage* (edited by Monier Atia). Cairo: Egyptian Printing Co.

Chapter 4: foreign phonemes are replaced with native language ones (/u, y/ underdifferentiation), allophonic rules are applied to native language stress-related phoneme distribution (/o, u (y)/ and /a, e, o/), and coarticulation, in general, plays a role in the formation of the nonstandard spelling variants. Already Girgis remarked (Girgis 1966: 73) that due to the strong stress accent in Coptic, unstressed vowels were heavily reduced in quality, and that the adjacent consonants could affect the vowel quality, so depending on the coarticulatory effect, i.e. quality of the adjacent consonants to which the vowel quality was assimilated, the unstressed vowel was represented with either <a>, <(e)i> or <ou> (the vowels reserved for the unstressed syllable; also other vowel graphemes could occur in 'vulgar' spellings).

Evidence for the effect of coarticulation can also be seen in Kahle (1954) *Bala'izah* (Vol.1). Kahle (1954: 52) presents some examples of dialectal variation in Sahidic texts that show apparent instances of coarticulation before e.g. /h/, a glottal fricative, articulated farther back at the vocal tract and therefore, in (anticipatory) coarticulation, likely to cause vowel retraction. True to form, the standard ⲉ <e> has been written as ⲁ <a>. Kahle mentions that this was particularly common in Sahidic texts coming from Ashmunein and Fayyum but not from Thebes; still, there are sporadic instances presenting this from other regions from Saqqara near the Delta to Abydos in Upper Egypt in addition to the aforementioned so this seems to have been a linguistic feature of Egyptian, the distribution probably mostly affected by the level of the scribal standard. Nevertheless this is one of the instances that falls under the phonological rule also in Modern Standard Arabic, another consonant-rich Afroasiatic language: /a/ retracts to [ɑ] adjacent to /h/ so logically, the two languages display the same phenomenon. According to Kahle, this also happens before /r/, m/ and /n/ but more rarely. There is also coarticulation involved with nonstandard writings of ⲏ <ē> instead of ⲉ <e> (standing for the supralinear stroke, /ə/), the mid vowel quality having raised before /n, m, r/ (nasal, bilabial, coronal); later in Coptic, also before /n, r, ʃ/ (nasal, coronals) (Kahle 1954: 54). It should be noted here that while these are Coptic phonological tendencies and could be seen as language specific, most of these also fall under phonetic universals, deriving from simple anatomically-induced coarticulatory processes.

The lip constriction when producing labials (here /m/), although considered front consonants, has a tendency to lower the F2 values of close vowels so that the vowel quality is in fact retracted rather than fronted; it becomes even more retracted than adjacent to velars.[54] This is due to the fact that when producing a labial, there is a 'trough effect': the tongue body lowers when producing a labial stop surrounded by close vowels, so vowels possibly assimilate to the lowered tongue body position making it difficult to effectively pronounce close vowels. Velars show no trough effect because of the required complete tongue body closure to be able to produce them. (Flemming 2009: 82-84; 92). Likewise, /r/ can retract close vowels; the same seems to go for /ʃ/. The effect of /n/, however, is unclear as it usually raises the vowel quality in languages; however, it has been found that the lower pharynx has a role in the production of *nasalised* vowels. The lingual height centralises in the production of them, much like with labials, which retracts the quality of close vowels and conversely, raises the open ones (Carignan, Shosted, Fu, Liang & Sutton 2013). Given the high tendency of Coptic for coarticulation it can perhaps be suggested that the production of a nasal consonant alone was enough to affect the quality of the vowels adjacent to it in some cases even without phonemic nasalisation in the language system.

Girgis (1966) did what Gignac (1976) did for Greek, i.e. collected evidence for all these nonstandard variants with a wide distribution both geographically as well as temporally. While Girgis's work gives a good outline of the overall picture of nonstandard phonemic variation in

[54] The second format is high in frequency in front vowels, corresponding to the forward position of the tongue. In back vowels, the F2 lowers, corresponding to the backward position of the tongue.

Greek loanwords in Coptic, it is still only a collection of single words without context, and tracking down individual variation would require going back to study the collections from which Girgis took his examples. I have therefore collected my own database of the already processed Greek loanwords in Coptic from the DDGLC database[55] to be able to pinpoint individual nonstandard scribal variation and idiosyncratic Greek usage in addition to analysing the larger picture, as these can contribute to the understanding of ongoing language change. The collection presents examples ranging from the earliest Fayyumic biblical texts to much later Theban documentary texts, with a continuum of the same linguistic features. Although not all Coptic dialects or time periods are represented in the database, the collection was considered carefully to be sufficiently representative for a wider investigation of the linguistic phenomenon, and is a good match for that presented by Girgis. Using the results of both of these collections will show that phonetic variation is a linguistic feature of Egyptian, not restricted to dialectal of idiosyncratic language use. From what will follow, it is possible to see that individual scribes at different time periods used L2 Greek in much the same way, influenced by the linguistic structure of their L1, with some added features from their dialectal background in phonology and orthography.

To give but one example, while e.g. ⲉ <e> for ⲁⲓ <ai> and ⲓ <i> for ⲉⲓ <ei> is seen all over the corpora, regardless of where, when and by whom the texts were written, a scribe with a Bohairic background would still write ⲕⲁⲧⲁ ⲡⲣⲏⲧⲉ <kata prēte> as ⲕⲁⲧⲁ ⲫⲣⲏϯ <kata pʰrēti> with the stop aspirated and the word-final standard /e/ as /i/, according to that dialect's phono-orthographic practices (*Vatican MS Copticus 69*, eight repeated attestations of the same form in the text; for Coptic dialectal phonology, see e.g. Kasser 1991a). It is also interesting that some scribes seemed to know Greek rather well despite some nonstandard forms within the texts as sometimes, the Greek loanword was written more according to the standard than was the standard Coptic modification of it. Such a case is for example the rendering of Greek ὅρασις <horasis>, in Coptic standard ϩⲟⲣⲟⲥⲓⲥ <horosis>[56] as ϩⲟⲣⲁⲥⲓⲥ <horasis> (*P.Hamb.bil. 1* 2.9).

23 texts were included in the analysis with a total of ca. 450 nonstandard variants; enough to form a comprehensive picture of the amount and type of variation in Greek usage. In addition to these, some test words were included from all collections; there were words of such high frequency that these were hardly ever misspelled, such as ϣⲩⲭⲏ (ψυχή) <psykʰē> and ⲙⲁⲣⲧⲩⲣⲟⲥ (μάρτυρος) <martyros>. Mostly the scribes got these right; if not, it can be seen as indicative of higher than normal rate of nonstandard variation. By and large the biblical texts produced a better level of standard than other ones, as was expected. Selected examples of the nonstandard variation in Greek loanwords in Coptic will be presented here following the same order of phoneme analysis as in Chapter 4 for Greek in OGN I. As mentioned, I have collected the evidence for Greek loanwords in Coptic already analysed from the extensive database of these in the DDGLC project. All Coptic standard forms referred to in relation to the analysis of the nonstandard ones are therefore according to what DDGLC have analysed unless otherwise stated.

---

[55] DDGLC has marked down the nonstandard variant, the Coptic standard, and the Greek original.

[56] DDGLC have estimated the Coptic standard according to two attestations of it mentioned in *Index Copte et Grec-Copte de la Concordance du Nouveau Testament Sahidique* (Draguet 1960: 132); it is also spelled similarly in *P.Berlin* 8 520, 8,11-10,22 (Richter, p.c.). Förster (2002: 586) gives the standard ϩⲟⲣⲁⲥⲓⲥ <horasis> but only gives one attestation of this as an example (*CPR IV* 136, 9). Based on this evidence, it seems more likely that the standard was ϩⲟⲣⲟⲥⲓⲥ <horosis> but sometimes the scribes wrote it more faithfully to Greek than it was standardised in Coptic, perhaps due to prestige reasons by those scribes that knew Greek well, to show language skills in the same way modern people might show knowledge of French or Latin by direct quotes.

5.1.1 Introduction of the material

Fayyum is the origin of the OGN I Greek texts so evidence from Fayyumic Coptic texts in comparison to texts from other Egyptian regions was needed to rule out mere dialectal influence to be the cause for nonstandard orthography in the Greek texts of Narmouthis. In addition, Fayyum is by far the most representative region in Egypt for Greek texts and conversely the least lucrative one for Coptic ones, so variation of bilingual language users' character was expected. This is somewhat confirmed by Boud'hors (2017: 425-430), where she lists several Greek expressions and words that were used in Fayyumic texts and not attested elsewhere. Among these are the extensive use of ⲉⲓⲣⲏⲛⲏ *eirênê* 'peace' in the expression 'peace be with you' (ⲧⲓⲣⲏⲛⲏ ⲛⲉⲕ *tirênê nek*), typically used in Fayyumic letters and documents (although other attestations exist). Similarly, according to Boud'hors, the usage of ⲕⲁⲗⲱⲥ *kalôs* 'well' in sentences like ⲧⲓϣⲓⲛⲓ ⲉⲡⲁϫⲁⲓⲥ ⲛ ⲥⲁⲛ … ⲕⲁⲗⲱⲥ *tišini epačais n san ... kalôs* 'I greet my lord and son fairly' is at the level of a cliché in letter writing in Fayyum.

The examples above are from later texts than discussed in this work (8th c. onward), and documentary, but surely the amount of sometimes even strange Greek usage is a sign of bilingualism that had been ongoing for a longer period of time. In the documentary ostraca studied in Boud'hors (2017), Greek and Coptic exist side by side, opening and closing formulas often written in Greek proper, and Greek lexica liberally used in various levels of integration in Coptic (Boud'hors (2017: 432). However, in the Fayyumic texts in this work, nothing extraordinarily significant in this regard was found compared with the other regions, although for instance *Hamburger bilingual 1*, an early Fayyumic biblical text, shows more nonstandard variation than the average. In general, biblical texts are usually of better standard than documentary ostraca, which can be seen in comparison of e.g. *P.Mich.* 6868(a), *Ecclesiastes* from Fayyum from the sixth to seventh century,[57] showing the most mild variation only in e.g. vowel quantity and the generally very frequent /ai, e/, /ei, i/ confusion, while the documentary ostraca of *O.Frange* show e.g. truncated words such as ⲗⲁⲙⲓⲧⲏⲥ <lamitēs> for ⲉⲗⲁⲙⲓⲧⲏⲥ 'Elamite' from Greek Ἐλαμείτης and ⲡⲣⲟⲫⲩⲧⲏⲥ <profytēs> for ⲡⲣⲟⲫⲏⲧⲏⲥ <profētēs>.

Although the latter was usually well remembered by scribes due to the word's high frequency, in here the orthographic form is affected by the contemporary Greek pronunciation with /y/ having raised to /i/. The differences in these texts are probably mostly explainable by genre, but *O.Frange* is also later and from an area with the least amount of Greek immigrants, Thebes. Therefore, Greek usage in the corpus was expected to have been different from that of e.g. Fayyum, with significantly less bilingualism in the Theban region to affect the outcome (c.f. the Greek usage of Ptolemaic Upper Egyptian scribes in Vierros 2012). The language use of Frange, the monk under whose name and personality at least most of the texts in *O.Frange* have been assigned has been described as highly idiolectic, although showing many Theban traits (albeit not systematically used), and probably in register close to the spoken language (Boud'hors 2010: 27). But not only may lack of experience in Greek or individual linguistic traits be the factor behind the different type of variation, the later time period is more than probably a contributing factor. Greek loanwords had by the ca. eighth century of *O.Frange* (dating by Boud'hors 2010: 9) been a part of Egyptian vocabulary for several centuries longer than they had been during the time of the earliest texts from Fayyum, so more integration in the language toward the native language phonology is a natural outcome; the words were treated without prestige-affected attention to the standard orthography, similarly to native language

[57] Estimated as F5, which is the chief sub-dialect of Fayyumic (Kasser 1991c: A124b), from 500-699 CE by Schenke & Kasser 2003.

words (more on this issue in Chapter 5.3.2.1). In addition, later Fayyumic documentary texts from the same period (8th c. and onward) have the same kind of variation in e.g. truncated word forms: for instance ⲁⲡⲟⲕⲣⲉⲥ <apokres> from ἀπόκρισις *apokrisis* 'separation' or ⲗⲉⲕⲱⲧⲥⲓ <lekōtsi> for ὁλοκόττινος *holokottinos* 'solidus' (Boud'hors 2017: 431; 437-438) so clearly, this is just a feature of Coptic influence.

P.Hamb.bil. 1, like *P.Mich.* 6868(a), is a papyrus codex, from the third to fourth century so it is almost from the same period as the Narmouthis corpus. Variation in Greek loanwords in these texts is on the whole not phonemically different from other Coptic texts, nor does it display any significant amount of *fayyumisms* (one instance of *lambdacism* i.e. /l/ instead of /r/ in ⲉ̣ⲗ ⲁⲥⲉⲃⲏ̣ⲥ̣ <el asebēs> for ⲣ-ⲁⲥⲉⲃⲏⲥ <r-asebēs> from Greek ἀσεβής *asebēs*, a typical feature of the Fayyumic dialect) but it does show a tendency similar to OGN I in that the writing forms have a near-phonetic tendency; incidentally, as mentioned in Chapter 4.1, there are no mix-ups of /l, r/ in OGN I either. It seems that, when compared with e.g. the style and standard in the later text of *P.Mich* 6868(a), the scribes were first generation bilinguals exactly like the scribes in Narmouthis, with less experience in Greek writing than the later generations of biblical scribes would have had. It is also more than probable that bilingualism in itself was a contributing factor to the level of nonstandard spellings; surely so much variation could not exist without knowledge of Greek phonology. Therefore, Greek internal phonological development can be seen in e.g. /ai, e/ and /ei, i/ confusion, but there is also quite apparent Egyptian-influenced allophonic variation in e.g. ⲙⲟⲭⲗⲟⲩⲥ <mokʰlous> (*P.Hamb.bil. 1*, *Lamentations*, line 2.9); interesting consonant variation can be seen in ⲉϫⲙⲁⲗⲱⲥⲓⲁ <edʲmalōsia> from the standard ⲁⲓϫⲙⲁⲗⲱⲥⲓⲁ <aikʰmalōsia> ('αἰχμαλωσία) (2.14) with another orthographic variant ⲉϫⲙⲁⲗⲱⲧⲟⲥ <ekʰmalōtos> in line 1.18, and ⲥⲁⲙ[ⲃ]ⲁ̣ⲑ̣ⲛ̣ <sam[b]atʰon> in line 2.6. as well as ϩⲉⲓ <hei> (line 2.20).

Vatican MS Copticus 69 is the latest one of the texts collections, dating to the thirteenth century, and showing examples from the Bohairic dialect. Two texts written in the Middle Egyptian i.e. Mesokemic[58] dialects are also included, and the famous *P.Bod.VI.* I have also included a literary piece in the form of *Alexander romance* for its display of some very creative adaptations of Greek loanwords reminiscent of the language in *O.Frange*, coincidentally also of Upper Egyptian origin and written in Sahidic. Some of these have variation of different kind with each other, e.g. the Fayyumic biblical texts *P.Mich.* 6868(a) and *P.Mich* 3520 differ largely in the amount and nonstandard type of variation from *P.Hamb.bil. 1*, also a Fayyumic biblical text. In the first two, there is mostly variation of the type that reflects Greek internal phonological development and in the latter, much more Egyptian-induced phonological and phonetic variation similar to that in OGN I. The difference in these texts is that *P.Hamb.bil. 1* is a private copy, while the two *P.Mich*. represent official copies, so it is more a question of standard and register than e.g. time period (*P.Hamb.bil. 1* is from the 3rd-4th c., *P.Mich*. 3520 is from the 4th c. and *P.Mich*. 6868(a) is from the 6th-7th c.).[59]

O.Frange shows similar phonetically motivated writing forms with *P.Hamb.bil. 1* but is perhaps a bit heavier on the Egyptian influence word-structurally, not only on the phonemic level. On the whole, however, it can be said that no collection differs dramatically from the

[58] The terms *Middle Egyptian* and *Mesokemic* are synonymous in the field of Coptic dialectology, but given that *Middle Egyptian* is also a term used for an earlier language variety (hieroglyphic Egyptian) as well as a geographical term, the term *Mesokemic* is used in this work for the dialect variety to better distinguish between these different areas related to Egyptology. *Mesokemic* is a hybrid form meaning 'Middle Egyptian', *meso-* naturally coming from the Greek μέσος <mésos> 'middle', and *kemic* from Egyptian-Coptic ⲕⲏⲙⲉ <kēme> meaning 'Egypt' i.e. the *black* land (derivative of ⲕⲁⲙⲉ/ⲕⲉⲙⲉ <kame/keme>, 'black' (Crum 1939: 109b-110a)).

[59] Both of the *P.Mich* contain features that follow the scriptoria standard, while the *P.Hamb.bil.1* has long, sloping lines and curvy handwriting, typical to private copies (Richter, p.c.).

others in the type of nonstandard variation when there is some, and most of them exhibit some of the more usual features of Egyptian-influenced phonological transfer, e.g. allophonic variation of /o, u/ and /a, e, o/, as well as the key elements of Greek vowel raising. I therefore consider the sample balanced as representative of different genres, time periods, and geographical distribution. I can state with confidence that the significant factor behind this phenomenon is embedded within the linguistic system of Egyptian in relation to that of Greek, and possible dialectal variation or that related to specific periods of time or a change in genre are of little real importance regarding the big picture, even if some details of variation can be explained in terms of these. Probably the most interesting individual variation in terms of orthographic semi-standards can be found from the scribe of *Codex Schøyen* from 4th c. CE (Mesokemic dialect), and interesting display of /y, u/ underdifferentiation can be found in *P. BL Or. 11732(2)* (also 4th c. CE Mesokemic), while in *P. BL Or. 4866* (8th c. CE from Djeme) already follows the Greek *iotacism* in replacing /y/ with a Coptic variant, /e/.

The linguistic attitude of the writers is, to say the very least, flexible. Meanings of the words are not hampered but there is a lot of variation, some similar to what native Greek writers might produce, i.e. confusion of vowel quantity/quality with ϵ, н <e, ē> and ο, ω <o, ō>, but some of a kind an L1 writer would never write, for example replacing ϵ /e/ with γ /y/. Having said this, the graphemic representation of the words is seldom incomprehensible. Variation mostly consists of small-scale, albeit relevant for recognition, L1 influence and writing out the Greek phonological developments.

5.1.2 Reduction of unstressed vowels in Coptic: /a, e, o/

Although some Greek loanwords in Coptic show exactly the same nonstandard variation phonemically as has been seen in Greek texts, e.g. word-finally the unstressed /o/ has been replaced with a better fitting /e/, it is important to understand the underlying phenomenon in this linguistic transfer, i.e. that the Egyptian scribes had a tendency for writing out the phonetic reality when standard orthography was not remembered. This means that coarticulatory effects in general can be seen on the level of orthography, as well as stress-related vowel weakening, giving emphasis to the stressed vowel in the word. Put another way, the phenomenon is the same even if the phonemes are not exactly the same or in the same position in the word as the nonstandard variation is in Greek texts – it is tied to the Egyptian phoneme distribution regarding stress, and the consonant-rich character of the language structure. This means that not all possible combinations or alterations syllable-structurally etc. are attested in the Greek texts – at the very least, not in the Narmouthis Greek corpus. For example, for the marking of word-final schwa there are hardly any attestations in the Greek loanword in Coptic database collected by myself. This is probably largely due to the fact that in OGN I the instances of unstressed /o/ mainly concerned aorist imperative verb endings, and the scribes tried to cope with these as best they could, native language phonology affecting the usage. Naturally, there are no aorist imperative Greek verb endings in Greek loanwords in Coptic, as verbs received no inflection in Egyptian and henceforth, Greek loanverbs had no inflection either. Regarding this, it is useful to be aware that Greek verb forms in Coptic texts might look like /o, e/ confusion when looking at the Greek original basic form but this is a coincidence caused by the modification of the Greek form when integrated into Coptic.

Greek verbs were not borrowed into Coptic in all their inflected forms. Egyptian/Coptic verbs had no conjugated forms but the person inflection was in the pre-Coptic stage added in suffix form and in the Coptic stage as a prefix to the verb. According to Layton, Greek verbs

were borrowed in their infinitive form and in Coptic only used in the absolute infinitive form,[60] and handled also otherwise differently than native language verbs in e.g. adding direct objects only through using a preposition. Morphologically, as e.g. the Greek infinitive ending *-ein* was truncated to *-e*, it looked like the active imperative singular form (Layton 2000: 155).[61] It is even possible that this form might for the Coptic-educated writers have been of influence in treating the Greek verb forms also in Greek texts. First of all, the nonstandard orthographic variants including word-final <e> might have resulted from a reminiscence of the graphic appearance of the verb ending including an <e>. Second, infinitive and imperative did not have separate forms in Coptic, so the polysemy of this might have strengthened the tendency of choosing the more frequent verb form as the basis. The aorist imperative ending was by this time declining in favour of the present imperative ending, actively replacing the aorist imperative ending *-on* with *-e* in these contexts, which is the situation in Modern Greek (Leiwo forthc.; Dahlgren and Leiwo in prep.; see also Section 4.3.1 for more elaboration on this issue). Not remembering aorist imperative inflection probably also received support from the polysemy of the Coptic infinitive/imperative usage (Dahlgren and Leiwo in prep.), so the matter is a complicated confusion of phonological and morphological factors affecting the L2 Greek usage of the Egyptian scribes.

All of the verbs from OGN I discussed in Chapter 4.3.1 end (nonstandardly) in *-e(n)*. However, as the Narmouthis Demotic texts include some Greek verbs written with the (infinitive) ending *-in*, it does not seem likely that if the scribes had the infinitive form in mind they would not have repeated the *-in* ending in the Greek texts as well but would instead have switched to *-en*. The written form *-in* seems like a phonetic reprentative for ειν <ein>, and although there might be some fluctuation in the phonetic quality of ει <ei> as it was sometimes written both with η <ē> [ę:] as well as ι <i> [i], (see Chapter 4.3.3), it is mostly written nonstandardly with ι <i> in OGN I. Therefore the infinitive form with its *-ein* ending does not seem to be behind the forms discussed in Chapter 4.3.1 but more than likely, the nonstandard forms are caused by misrepresentation of the phonetic level.

Therefore, it seems that frequency of being familiarised with the spellings is of importance, and they were probably better remembered with noun endings as many Greek nouns ended with *-os* or *-on*, whereas the complexity of the Greek verb inflection system might have left many L2 writers uncertain. However that may be, in the Greek loanword database the replacement of unstressed /o/ occurs in other positions than word-finally, but it is not replaced with <e>. At other positions of the word, the quality of it seems to be tied more to the consonantal surroundings because vowel quality is shorter word-finally so schwa does not have time to reach its target properly and is therefore more vulnerable to be assimilated to the quality

[60]Native Egyptian verbs could either get a stative (l. qualitative, expressing being in a (particular) state, enduring state of the subject in a verbal action) or an infinitive state (expressing process or entry into a state (non-durative)), see e.g Layton (2000: 126; 129-130).

[61]There is ongoing debate about the morphological form in which the Greek verbs were borrowed into Egyptian. Arabic loanverbs in Coptic were borrowed in the imperative form (Richter 2015: 231-232), which according to Wohlgemut (2010: 79) is a well-attested form cross-linguistically for verb borrowing. However, it also seems that the form varied within the Coptic dialects: the Northern dialects seem to have borrowed the Greek verbs in the infinitive (with the ending *-(i)n*) while others seem to have used the imperative as the basic form (with the ending *-e/i*). Fayyumic is strictly speaking a part of the Middle Egyptian major dialect group but perhaps could phonologically speaking be considered more Northern than Southern, as it contains more similarities on the phonological level with Bohairic (a Northern dialect) than Sahidic (Southern) (see Worrell 1934: 78-79; 83 and Kasser 1991b). The Demotic ostraca of Narmouthis have Greek loanverbs that carry the distinctive ending *-in* (Grossman & Richter 2017: 215-217) so it seems to be part of the infinitive borrowing group. After a comprehensive analysis, Grossman & Richter however conclude that the two separate forms, one ending in *-in* and one in *-e/i*, have to do with the loss of the final *-n* from the bare verbal stem, which had to do with Coptic phonology (which makes all the borrowings to have come from the infinitive, ending in different forms through phonological processing). (Grossman & Richter 2017: 208-223).

of the following phonemes (see Chapter 4.3.2.3 for clarification). Such an example is e.g. ⲕⲁⲗⲁⲕⲓⲁ̅ <kalakia>, following Coptic standard spelling from the Greek original κολακεία *kolakeia* 'flattery' (a part of standard greeting formula) from *Vatican MS Copticus 69*, line 73. The manuscript is a late one (13th c.) and written in "acceptable Bohairic" according to the editor Zaborowski (2005: 3). In the same corpus, there is also another example (line 3) where /a/ has been replaced with <e> in ⲉϫⲓⲟⲩ <ekˢiou> from standard ⲁϫⲓⲟⲩ *akˢiou* 'think, deem worthy' (Greek original is ἀξιόω). ⲉϫⲓⲟⲩ <ekˢiou> is also found in *P.Ryl.Copt.* 275, from Hermopolites in Middle Egypt, 3rd-4th c.[62]

Both examples reflect apparent coarticulation. By any account, /o/ in *kolakeia* should be counted as unstressed, so it is acoustically indistinct and the writing form reflects the consonantal surroundings: /k/ has the ability to lower the quality of vowels so /o/ has been replaced with /a/. Once again, I believe orthographic practices to have made an impact here, as the unstressed Greek /o/ has been removed from even the standard. On the other hand, the unstressed /a/ has been replaced with /e/ in ⲉϫⲓⲟⲩ <ekˢiou> which indicates raising of vowel quality. This odd discrepancy is explained by the velar consonant's ability to assimilate vowel value to its articulatory place, noted in e.g. Ditidaht (Sylak-Glassman 2014: 22; 30) and American English (Hillenbrand et al. 2001: 754). In effect, this means that open vowels are fronted and raised, whereas close vowels are retracted; in American English, the phenomenon was even stronger if the consonantal environment was initial instead of final, as it is in both of the examples analysed here. This matter is discussed in more detail in Dahlgren and Leiwo (in prep.).

Codex Schøyen MS 2650 = mae-2, which is a papyrus codex and represents the Mesokemic dialect (Oxyrhynchus region) from the 1st half of fourth c. (Schenke 2001[63]), is the earliest Gospel of Matthew in any Coptic dialect. *Codex Schøyen*, although a biblical manuscript, contains several spelling mistakes from the more usual ones dealing with Greek vowel raising to the typical Coptic-induced consonantal variation involving Greek voiced consonants being replaced with voiceless ones, as in ⲥⲓⲥⲁⲛⲓⲟⲛ <sisanion> (standard ⲍⲓⲍⲁⲛⲓⲟⲛ) from ζιζάνιον <zizánion> 'a weed (darnel?)' (13, 25) and ⲡⲓⲣⲁⲥⲏ <pirasē> from ⲡⲉⲓⲣⲁⲍⲉ <peiraze> from Greek πειράζω <peirázō> 'try, attempt' (22, 18, twice). Variation, in general, is colourful, although the hand has been described as 'a fine regular Coptic uncial' in the Schøyen collection's manuscript website and 'Biblical majuscule' in Trismegistos.org.[64] This is a free translation not part of the canonical versions of Matthew, and the codex has been subject to study for its irregular and sometimes surprising language use by several researchers, an outline of whose findings are found in the introduction to the manuscript (chapters 1-3) of Leonard (2014). Among other features, some unusual plural forms and uses of conjunction have been noted, seen as part of the Mesokemic dialect practices. Mesokemic dialect as a literary standard was short-lived but on the other hand, rapidly standardised in the 4th-5th centuries (Leonard 2014: 2, f.n. 8), but the presence of so many irregularities and orthographic variants suggests deviation of any standard, which could be accounted for by the nature of the text, a free translation (Anne Boud'hors, p.c.). The standard of the text is greatly different from e.g. the *P.Mich.* texts, which only display a small amount of variation of the most simple kind, related to Greek internal phonological changes.

The scribe writes ⲡⲟⲗⲓⲥ (πόλις) <polis> 'city' according to the standard in 9, 1 but ⲡⲟⲗⲉⲓⲥ <poleis> in 8, 33, but at the same time ⲇⲓⲕⲁⲓⲟⲥ (δίκαιος) <dikaios> 'just' correctly in 10,41

[62] Middle Egypt, although a part of Upper Egypt, was considered as culturally closer to Lower Egypt than Upper Egypt. It is a 19th c. division of archaeologists and stretches from upstream from Asyut in the south to Memphis in the north. Even today, the Egyptian Arabic living in the area share more linguistic features with Cairene and rural Delta Arabic than with Sa'idi Arabic spoken further the south (Baines, Málek and Speake 2000).
[63] More information in the Schøyen Collection website www.schoyencollection.com.
[64] http://www.trismegistos.org/ldab/text.php?tm=107733.

instead of the often-repeated, near-standard phonetic spelling ⲇⲓⲕⲉⲟⲥ <dikeos> present in so many manuscripts of even generally better quality. The scribe is also trying to indicate the phonetic quality of /b/ in (Hebrew original) Greek loanwords *sabbaton* and *rabbi* in an interesting way: ϩⲣⲁⲙⲃⲉⲓ <hrambei> (23, 6-7, twice) from the standard ϩⲣⲁⲃⲃⲉⲓ <hrabbei> (ῥαββί <r^{h}abbi>) has in the nonstandard production the sonorant /m/ before <b> to mark the plosive to be pronounced as a voiced one, and similarly in ⲥⲁⲙⲡⲁⲑⲟⲛ <sampat^{h}on> (28, 1) from what was probably[65] standardly ⲥⲁⲃⲃⲁⲧⲟⲛ <sabbaton> (Greek σάββατον <sabbaton>), /m/ has been placed before <p> for the same purpose. As much as for all the other nonstandard variation, then, there is an evident tendency for phonetic spellings, and in line with all the other variation in the codex, there are also nonstandard spelling of /a, e, o/.

Similarly to *ek^{s}iou/ak^{s}iou* (in *Vatican MS Copticus 69*), there is an example of this particular confusion in *Codex Schøyen* 13, 3 with ⲁⲩϫⲉⲛⲉ <auk^{s}ene> (Coptic standard ⲁⲩϫⲁⲛⲉ <auk^{s}ane> from αὐξάνω <auk^{s}anō> 'increase') where the first part of /k^{s}/, a velar, has caused the fronting of /a/ to /ɛ/. I believe the Coptic stress to be in the second syllable even if it contains the only nonstandard spelling. According to Peust (1999: 270), (in the qualitative hypothesis) the short vowels ⲏ, ⲟ, ⲱ <ē, o, ō> /e, ɔ, o/ only occur in the stressed syllable. Could the scribe have tried to indicate stress with ⲉ <e> /ɛ/, most often reserved for the unstressed syllable, meaning ⲏ <ē> /e/? The difference in quality is not huge, and clearly, the quantity/quality difference between ⲉ <e> and ⲏ <ē> means nothing to the scribe, as seen in ⲛⲏⲥⲧⲉⲩⲏ <nēsteuē> for ⲛⲛⲥⲧⲉⲩⲉ <nēsteue> (Greek νηστεύω <nēsteuō> 'to abstain from'; 6, 16) and ⲧⲟⲧⲏ <totē> for ⲧⲟⲧⲉ <tote> (Greek τότε; 16, 6), among others – there are nineteen (19) instances where ⲉ <e> has been replaced with ⲏ <ē>, whereas there is only one confusion between ⲟ <o> and ⲱ <ō>, in (16, 11) ⲥⲁⲛⲇⲟⲩⲕⲉⲱⲥ <sandoukeōs> for the standard ⲥⲁⲇⲇⲟⲩⲕⲁⲓⲟⲥ (Σαδδουκαῖος) <saddoukaios> (personal name). Incidentally, *Sandoukeôs* also displays the same technique for marking down the voiced plosive as was used in *sabbaton* and *r^{h}abbi,* placing /n/ before /d/, evidently to make sure the pronunciation would not lack voicing; the name also contains the very frequent phonetic spelling of /ai/ with ⲉ <e>. The nonstandard confusion between ⲉ <e> and ⲏ <ē> in this scribe's language will be further examined in Chapter 5.1.4.

Codex Schøyen also has the /a, e, o/ confusion in a number of other examples. 14, 4 has ⲑⲁⲣⲁⲡⲉⲩⲏ <t^{h}arapeuē> from ⲑⲉⲣⲁⲡⲉⲩⲉ <t^{h}erapeue> (θεραπεύω <t^{h}erapeuō> 'to be an attendant, do service'), in which the nonstandard ⲁ <a> is probably representative of an unstressed syllable's indistinct quality i.e. schwa, perhaps pushed backward by the adjacent /r/, although /r/ generally seems to centralise vowels (see Section 4.3.2.4 for *ek^{h}tron*). ⲑⲁⲣⲁⲡⲉⲩⲏ <t^{h}arapeuē> from ⲑⲉⲣⲁⲡⲉⲩⲉ <t^{h}erapeue> is again repeated in 17, 16 so it seems unlikely we are dealing with a scribal error here. ⲁⲙⲙⲏⲧⲓ <ammēti>, the nonstandard production of Coptic standard ⲉⲓⲙⲏⲧⲓ <eimēti> for Greek εἰ μή τι <ei mē ti> 'if not somewhat', definitely has the retraction of the front diphthong ⲉⲓ <ei> (be the phonetic value of it /ei / or /i/) to /a/ adjacent to /m/. The syllable is probably unstressed even in Coptic, and vulnerable to the bilabial's ability to lower the F2 of close vowels (see above in Chapter 5.1).

Girgis (1966: 82-83) has an example more similar to the ones in OGN I, with the word-final Greek /o/ being replaced with /e/ in e.g. ⲛⲟⲩⲙⲉⲥ <noumes> from νουμμος <noummos> (Lat. *nummus*, a coin, often meaning *sestertius*). Interestingly, according to Kahle (1954: 56) there are some instances of <e> being replaced with <o> from Fayyum (Hamburg Old Fayyumic text i.e. *P Hamb.bil. 1*). This gives new light to *gitōnos* which seemed to be some sort of a local standard precisely in the Fayyum area, considered in Chapter 4.2.1 as perhaps a

[65] DDGLC mentions no standard but Förster has ⲥⲁⲃⲁⲧⲟⲛ <sabaton> (4), ⲥⲁⲃⲁⲧⲱⲛ <sabato:n> (3), ⲥⲁⲃⲃⲁⲧⲟⲛ <sabbaton> (17), ⲥⲁⲃⲧⲟⲛ <sabton> (1) and [c]ⲁⲙⲃⲁ[ⲧⲟⲛ] <[s]ambạ[ton]> (1). Out of these, ⲥⲁⲃⲃⲁⲧⲟⲛ <sabbaton> has clearly the most attestations. Most of the attestations, as far as they can be dated, are from letters from 7th-8th centuries with a variety of regions (Förster 2002: 713-714).

hypercorrective form. Perhaps it was only affected by the Fayyum region scribes' tendency to write out a dialect-specific variant. Was <o> the equivalent of <e> in other regions, and intending to function as a marker of schwa?

Kasser (1991a) lists dialectal variants in which F7, a Fayyumic subdialect (according to Kasser an archaic, northern form of Fayyumic), has the form *sôtom* 'hear, listen' in a list in which all other dialects, including other Fayyumic variants, have *sôtem*, *sôtm*, or *sôtme/ sôtm(e)*. The stress was on the first syllable long vowel, leaving the final syllable unstressed. It seems clear that the various forms listed here employ different strategies in which to display the unstressed vowel's quality, and bearing in mind that Coptic phonetically had no unstressed /o/, the F7 marking of the final syllable with <o> must be a graphic convention for schwa in that dialect. In Kasser (1991c), he elaborates that F7 specifically used <e> (sometimes <i>) "after a closed tonic syllable, in a closed atonic syllable with a sonorant as the final", but <o> before the bilabials /m/ and /b/ (such as in *sôtom*). Other Fayyumic dialects (generally = F) used <e> also for this purpose. Marking the unstressed syllable with <o> is therefore an exception and possibly limited to some coarticulatory purposes as bilabials tend to lower the quality of close vowels, as mentioned before, as well as round the vowel quality (see e.g. Traunmüller 1999: 142). Whether this explains the confusing nonstandard usage of *gitōnos* mentioned in Section 4.3.2.1 is a good question as clearly, this word does not end in a bilabial. Then again, if coarticulatory processes are at play, nasals do have the same tendency as bilabials in being able to retract the quality of close vowels and conversely, raise the open ones, as mentioned in Section 5.1. This could explain *gitōnos*. On a final note, however, my personal opinion is that nothing in Coptic vowel orthography is as accurate as to enable tracing features back to dialect-specific graphemic conventions – this much is clear from all the many native language vocabulary written variants, partly due to the tendency of written Coptic often mixing several dialectal variants (for this, see e.g. Boud'hors (2017), along with many others), and Greek loanwords surely display even more variation, not being an identical match to Egyptian phonology. But something can be deduced from listing out these practices:

1) F7 had the tendency to sometimes mark schwa with <o>, in addition to the more usual <e> used in all the other dialects as well. This was possibly due to coarticulation involving the adjacent consonants' quality. It is possible that other Fayyumic varieties might have the same graphemisation from time to time, or even other dialects of Coptic. Kasser (1991c) mentions that central F (= F4 + F5) was manifold and multiform, often with features from the neighbouring dialects Sahidic and Mesokemic. All that we know, therefore, is that in Coptic, schwa could be marked with <e>, <o> or the supralinear stroke (or nothing at all, if it was considered as part of a syllabic consonant).
2) F7 is an "ancient" form of Fayyum, considered a protodialect albeit not in all its aspects, but certainly possessing archaic peculiarities. This would make it earlier than F4, which has limited attestations from fourth-sixth c. onward and is considered the oldest of Fayyumic dialects. (Kasser 1991c). For reference, *P.Hamb.bil. 1,* which is rich in similar spelling variants as seen in OGN I: dates around 3rd -4th c. CE and has been seen to represent F7.
3) *Gitōnos* in OGN I is from the second century CE so from the alleged time period of F7. Coptic orthographic conventions, however fluctuating at that time period, may have had an effect on the Greek written in Fayyumic Egypt, provided that the writers knew how to write (Old) Coptic. Given that the Narmouthis Demotic ostraca have some, although limited, writing of a preliminary form of Coptic (see Section 2.2), we can assume that the scribes in Narmouthis had some knowledge of (Old) Coptic writing. Furthermore, the early time period for Coptic is an explanatory factor for the orthographic fluctuation as the conventions were only developing.
4) The aforementioned being the case, the writers tried to depict phonemes as faithfully as they could on the graphemic level, which is the starting point of any writing system.Therefore

taking even the phonetic level with coarticulation and allophonic variation into account does not seem like a vary strange concept.

Whatever is the reason behind the F7 quite environmentally specific tendency for sometimes using <o> to write out the word-final unstressed vowel, it seems fairly certain it was restricted to an early period of Fayyumic as Boud'hors (2017) makes no mention of this kind of alteration in Appendix 3 where she lists the usual nonstandard spelling variants along with many others that have been presented also in this work: fluctuation between voiced/voiceless stops, fluctuation of front vowels, and stress-related allophonic variation between /o, u/. Boud'hors's Fayyumic material is much later, from 8th c. onward. More on this early tendency of Fayyumic orthographic practice possibly effecting Greek writing will be considered in Dahlgren (in prep. (a)).

5.1.3 Underdifferentiation of /y, u/ and phonemic quality of Greek <y>

ϛτογλλογϲ <stoullous> from the Greek στῦλος <stylos> in *P.Hamb.bil. 1* presents the exact same underdifferentiation of /y/ as OGN I: 42(, 47) *pourou*, Greek /y/ in the first syllable being replaced with /u/. It is an interesting piece of evidence as also the second syllable displays nonstandard orthography under the influence of Egyptian phonology, i.e. the unstressed /o/ in the second syllable being replaced with /u/, according to Coptic stress-related phoneme distribution (see next section for further analysis).

Underdifferentiation of /y/ is also visible in ϰογϰϩ' <kouk^{s}> in *P. BL Or.* 11173(2), representing Mesokemic dialects, from the Greek original κόϊξ <koik^{s}>. The nonstandard form manifests both Greek internal phonological development as well as impact of Egyptian. οι <oi> of course was at this time pronounced /y/, which phonetic form serves as the base for the Egyptian integrated Coptic form, replacing /y/ with /u/. It also proves that at least this scribe had knowledge of contemporary Greek pronunciation as /oi/ from the Greek original has been replaced with /u/, not for example /e/, which would be expected if <y> were at this time pronounced /ø/, let alone the original grapheme correspondent /oi/. The collection is dated to the fourth-fifth century,[66] not far from the dating of the Narmouthis Greek collection. DDGLC has established the standard as the same, the phonetics in the standard form reflecting the time period in which the word was borrowed.

There is yet another example with a nonstandard <oi> from Greek original <y> which can be used to prove the phonemic quality of Greek <oi> as /y/. This one is from the *Codex Schøyen* Gospel of Matthew from the first half of the fourth century (estimation by Schenke 2001), from the Mesokemic dialect. In this one, the /y/ is presented in a nonstandard ⲁ̣ⲡⲟⲗⲟⲓ <apoloi> from the Greek verb ἀπολύω <apolyō>, from which Coptic has produced the Egyptian-integrated standard form ⲁⲡⲟⲗⲩ <apoly>. Again, this is close to the dating of the Narmouthis Greek collection, so the time period matches with the stage of the raising of /oi/ and /y/ to /i/, and obviously these are merged as /y/ at this point. Another attestation comes from Codex Schøyen for the evident quality of /y/: ⲡⲟⲓⲗⲱⲛ <poilōn> from the standard ⲡⲩⲗⲱⲛ <pylōn> (πυλών) 'gateway'.

BL Or. 4866 15-18 gives us the nonstandard ϫⲁⲛⲁⲣⲡⲁⲅⲏ <sanarpagē> from ϭⲩⲛⲁⲣⲡⲁⲅⲏ (συναρπαγή) <synarpagē>, which displays the same phenomenon as discussed in Section 4.3.2.1 (continued in Section 4.3.2.2), thought to represent a much retracted /i/. *BL Or.* 4866 dates back to second half of the 8th century so without a doubt, Greek /y/ had by this time finally raised to /i/, and this is one convincing example of it; other, rounded vowels would have been expected here in terms of nonstandard replacements had the quality of *ypsilon* still been retained at /y/ at this time. Such an example is e.g. ⲙⲱⲣϩⲛⲏⲛⲏ <mōrsēnē> from Greek μυρσίνη <myrsinē> 'the myrtle' (Girgis 1966: 81; example in *BM.* 1008, 419a, 4-5). Crum (1905: 418b) estimates the language as partly containing archaic idioms, partly appearing as those from 7th-8th c. documents from Hermopolis (Ashmunain). The text is a magical charm i.e. part of the documentary category, therefore not surprising in having nonstandard variation. However, in my opinion the seemingly round quality of the vowel is probably only an indication of a slightly rounded quality of schwa (or indeed only a choice of the <o> as a graphemic representation of schwa), the vowel appearing in the unstressed syllable, and immediately after a bilabial able to have this effect on vowels.

As is clear, then, there are some attestations of the quality of *ypsilon* in the corpus but not many attestations from /y, u/ underdifferentiation in this material, and even Girgis offers only

[66] 364-449 according to Schenke (1992: 49).

one example: ⲙⲟⲩⲗⲱⲛ/ⲙⲟⲩⲗⲟⲛ/ⲙⲟⲩⲗⲟⲟⲛ <moulōn/moulon/mouloon> for μυλών <mylōn> 'mill-house', which, however, has several attestations in a number of texts (Girgis 1966: 81). Most of Girgis's examples come from 6th to 8th c. when, for some reason, the quality of /y/ fluctuated between <e-o-u-a>; one, very late example (10th c.) depicts <y> as /i/ in ⲕⲓⲣⲓⲁⲕⲏ <kiriakē>. When examined as a whole, a picture emerges that Greek /y/, especially when unstressed, received the fate of being treated as equivalent to schwa before the final raising to /i/, which apparently did not take place before the 9th-10th century. This is understandable, as /y/ was a foreign phoneme to the Egyptians, so an accurate perception of it would have been surprising. Furthermore, it appears that coarticulation might have dictated the vowel quality chosen for the graphemic level. Although there are a couple of instances with an adjacent bilabial and a resulting /e/ or /ə/ (on the graphemic level <e> and the supralinear stroke), mostly the resulting central vowel has a nearby central consonant in the same syllable, and the resulting nonstandard round vowels have adjacent bilabials. Mostly the commanding consonant occurs before the resulting nonstandard vowel, so the coarticulatory effect is anticipatory.

It seems that compared to the treatment of *pourou* analysed in Chapter 4.2.2.1, a couple of situations have changed by this later period of time regarding the nonstandard treatment of Greek /y/ by Egyptian writers. First, the quality of /y/ was no doubt changing closer to /i/, which is probably one reason it is displayed with graphemes more apt to describe more central vowels than in the case of *pourou*, which uses a back vowel for the nonstandard production: <e> could stand for [ɨ, ɵ, ə, ɜ, ɘ], <o> for [ɵ, ə, ɘ] and <a> for [ɜ, ɐ]. This means to say that roundedness must be disappearing at this time. Second, another contributing factor might be that Fayyumic scribes might have been more attuned to the quality of roundedness in the first place, being more used to hearing Greek in the bilingual setting of Fayyum than the scribes from Upper Egypt, regardless of the later period, who act much more like the Maghrib Bedouin Arabic speakers described in Section 4.3.2.1 in pronouncing French /y/ as /i/ rather than /u/, as e.g. the English, Italian and Spanish speakers in the same study. In other words, as there was no close front rounded vowel in Coptic, this was analysed without the roundedness, and heard as some sort of a retracted version of /i/, the more precise quality depending on the quality and the effect of the adjacent consonants. In my opinion, taking the two factors combined is a realistic scenario as to why /y/ was probably later (also in Fayyum; see Boud'hors 2017: 437) being underdifferentiated with /i~e/ (before the final raising to /i/). Furthermore, it has to be taken into account that Greek loanwords had by this later period been longer a part of Coptic, which would have accelerated the integration of them to the native language phonemic system, leaving clearly foreign phonemes out of them.

This hypothesis is somewhat strengthened by the fact that the examples extracted from the manuscripts *P.Hamb.bil. 1* and *BL Or.* 11173(2), which have /y, u/ underdifferentiation and come from Fayyumic and Mesokemic dialectal areas, are also quite early in dating, lending support to the idea presented in Chapter 4.2.2 concerning the development of societal bilingualism, with Fayyum as the focal point in this. The attestations that Girgis presents (three manuscripts) of the nonstandard *moulōn*, however, are all Sahidic, but this could be a rare coincidence, and as the other nonstandard variants, may be tied to schwa-related consonantal coarticulation with the bilabial affecting the vowel production. The explanation does not seem as simple as this regarding *pourou*, although it certainly has a bilabial right before the nonstandard vowel, because the standard *pyrou* also has the nonstandard variant <poirou> /pyrou/ in the same corpus, so the scribe had an idea of the quality (and especially of the roundedness) of Greek /y/, and was trying to repeat this in various graphemic forms.

Futhermore, it has to be noted here that Coptic texts are notorious for lacking certain information on provenance. In other words, it is often not known whether the writer of the text was actually from the area in which the text was found as often, there are features of several (often two) dialects in any one writer's text production (see e.g. Boud'hors (2017) on this).

Therefore, e.g. so-called Sahidic texts, it being the Coptic standard literary language form, could certainly have been written by a person with a Fayyumic dialectal background.

To conclude, the variation between nonstandard productions of /y/ is a complex issue that seems to be mostly tied to coarticulation like most of nonstandard writing by L1 Egyptians, except the earliest examples of it concerning a simple underdifferentiated confusion between /y/ and /u/. Furthermore, how /y/ is realised by Egyptian writers is connected to the temporal situation of the quality of *ypsilon* in Greek. This seems evident in the Greek texts in Egypt, but deciding whether this truly is reflected also in Greek loanwords within native language Coptic texts requires further research on Coptic material.[67]

[67] At present this is more complicated than studying linguistic features in Greek because Coptic material does not exist to the same extent online as Greek does, nor does it have editorial corrections on nonstandard language in e.g. the Papyrological Navigator. Therefore searching for text irregularities digitally is not an option, and finding enough of these manually was unfortunately not possible within the scope of this work.

5.1.4 Stress-related allophonic variation /o, u (y)/

In Chapter 4.3.2.3 I showed evidence of the possible transfer of Egyptian stress-related allophonic usage on Greek in e.g. the nonstandard variant *stryp^{h}es* from the standard *strop^{h}és,* and possibly also in the name *Kleupis*. Girgis has an example of a similar type to Κλευπις <kleupis> where unstressed /o/ after /e/ has been replaced with <y> in a name: ⲑⲉⲩⲇⲱⲥⲓⲟⲥ <t^{h}eudōsios> from Θεοδόσιυς <t^{h}eodósius> (Girgis 1966: 82; *JKP* 46, 11 etc.); there are also attestations of the famous Kleopatra being written in the same way, ⲕⲗⲉⲩⲡⲁⲧⲣⲁ <kleupatra> (Hasitzka 2007: 50 gives three attestations). On the other hand, a stressed /o/ after /e/ is retained in ⲑⲉⲟⲇⲱⲣⲉ <t^{h}eodōre> from the Greek Θεόδωρος <t^{h}eodōros> (Girgis 1966: 85; Hasitzka 2007: 36-37 for several more examples with varying forms of /o/ in the same position); furthermore, stressed /o/ is still a part of the shortened versions (name combining Richter 2000: 114) of the same name ⲑⲟⲇⲱⲣ <t^{h}odōr> and ⲑⲟⲧⲉⲣ <t^{h}oter> (Hasitzka 2007: 38-39). Based on these examples it seems that the influence of Egyptian is a stronger factor behind these writing forms involving the change from /e-o/ to /eu/, if not because of anything else then for the tendency to write down coarticulatory and stress-related allophonic variation.

P.Hamb.bil. 1 provides an example of stress-related /o, u/ allophonic distribution. Greek loanword ⲙⲟⲭⲗⲟⲥ (μοχλός) <mok^{h}los> has been written as ⲙⲟⲭⲗⲟⲩⲥ <mok^{h}lous>, giving legitimate reason to suspect stress transfer from Egyptian on the Greek word. The word has two /o/s and the one which has the Greek stress has been replaced with /u/. When the other one has been retained it is probably because it did not create any problems regarding its pronunciation, i.e. it was not in danger of being reduced due to weak acoustic qualities. This is an interesting example as the word consists of two syllables, and as was established in Chapter 4.2.2, there is variation in Coptic in how stress is placed in disyllabic words. In this example, for some reason the stress seems to have been placed onto the first syllable, unlike what seems to be the case in Κλευπις <kleupis> and στρυφης <stryp^{h}ēs>, judging by their nonstandard vowels.

ⲥ̣ⲧⲟⲩⲗⲗⲟⲩⲥ <stoullous> from the Greek στύλος <ˈstylos> (*P.Hamb.bil. 1* 3.10) has already been analysed regarding the underdifferentiation of /y/ but it also presents allophonic variation related to Egyptian prosody-dictated phoneme distribution. While the first syllable has /u/ for representation of Greek /y/, the second syllable is evidently marked as unstressed because Greek unstressed /o/ is replaced with /u/; according to Girgis (1966: 89-90), /o/ was mostly retained in the stressed syllable. This time Greek stress has been retained or Egyptian stress coincides with the Greek one; stress is on the first syllable, as in the previous example.

ⲗⲉⲃⲉⲛⲟⲩ[ⲥ] <lebenou[s]> (*P.Hamb.bil. 1* 3.6) from the standard ⲗⲓⲃⲁⲛⲟⲥ <libanos> (λίβανος) also replaces Greek stressed /o/ with /u/. The word has apparently been written in the same way in lines 4.8 and 5.15 although not all letters are visible in these; in 4.13-14 there is also a ⲗ̣ⲓⲃⲁⲛⲟⲥ <libanos>. The word does appear to keep the Greek stress (λίβανος <ˈlibanos>) if the criterion of the /o, u/ variation is used for evidence of Coptic unstressed vowel quality (more analysis for ⲗⲉⲃⲉⲛⲟⲩ[ⲥ] <lebenous> in Chapter 5.1.4) – or at least it is not transferred on the ultima. The same applies to ⲙⲟⲩⲛⲁⲭⲟⲥ <mounak^{h}os> from the Greek μοναχός <monaˈk^{h}os> (*Vatican MS Copticus 69* 43) as the Greek stressed /o/ in the final syllable has been retained and the one in the first one has not. The word was standardised into Coptic as ⲙⲟⲛⲁⲭⲟⲥ <monaˈk^{h}os>, and is a good example of one of the instances where the Greek and Egyptian unstressed syllable seems to coincide. It is a trisyllabic word and hides where the Egyptian stress might actually have been placed. Stress in Greek is on the ultima, and likely this is the same in Coptic as the /o/ is retained, although it is of course possible that the final /o/ has merely been memorised because of the large frequency of Greek words ending in *-os*; ⲡⲟⲗⲩⲙⲟⲥ <polymos> (*Alexander Romance*: fr. 7v,13-15; fr. 5r, 22-23) from the standard ⲡⲟⲗⲉⲙⲟⲥ <polemos> (πόλεμος) is another good example of this. According to Girgis (1966: 73 and 86),

/a/ was well retained both in stressed as well as unstressed syllables. Therefore, it is difficult to say where the stress lay in ⲙⲟⲩⲛⲁⲭⲟⲥ <mounakʰos>, it might have been on the ultima or the penultima, but it clearly was not on the antepenultima (disfavoured in Coptic, in addition to it not in this word being there on the Greek one either). This is one of those examples dealt with in more detail in Chapter 4.2.2 that might or might not sustain the Greek stress, where the real prosodic reality might have been masked by the similarity of stress placement and syllable structure of Greek and Egyptian. Nevertheless the attestation is a late one (13th century) and written in Bohairic, so it serves as an example of the allophonic variation being of general Egyptian character. Another variant of the same word is attested as ⲙⲱⲛⲱⲭⲟⲥ <mōnōkʰos> in *O.Frange 8*, 7, which might narrow down the stress placement problem. As two of three syllables contain a nonstandard vowel grapheme in this attestation, it seems likely that the one which has been retained from the standard presents the stressed syllable. According to this, then, the stress lay on the ultima.

As in Greek vowel variation dealt with in Chapter 4.2.2, the /o, u/ variation does not only concern adjacency to nasals, judging by e.g. ϣⲧⲟⲩⲗⲗⲟⲩⲥ <stoullous>, in which /o/ has been replaced with /u/ after /l/ similarly to Τροειλου <troeilou>, analysed in Chapter 4.2.2 as a possible case mix-up. Therefore it seems likely that it is mainly a stress-influenced phenomenon, related to the allophonic variation between /o/ and /u/; furthermore, apart from <tʰeudōsios> and the different phonetic explanation behind it, it is probably not irrelevant that it takes place after front consonants that have a tendency to raise the vowel quality, i.e. after /n, m, l/. Coarticulation is a regular feature in the nonstandard spellings written by the Egyptian scribes. Even in the examples provided by Girgis (1966: 81-82), /o/ is not replaced with /u/ only after /m, n/, but seems to be related to what the consonantal environment is. The tendency seems to point toward favouring /u/ with phonemes that might raise the vowel quality from /o/ to /u/ i.e. bilabials, dentals, liquids, with the exception of e.g. replacing /o/ with /a/ (adjacent to liquids and bilabials) if it appears in pre-stressed syllables of the word, and with /u/ or /e/ if post-stressed. The sample so far is small, though, so more research is required to solve the matter.

5.1.5 Fluctuation of /i, e/ and the quality of *eta*

/ai, e/ confusion as well as /ei, i/ is everywhere in Greek loanwords in Coptic. However, the Narmouthis ostraca have no examples of <ai, ē> confusion but there are some in Greek loanwords in Coptic, suggesting that the quality/quantity difference was not much noted by some writers. For example there is ⲛⲏⲧⲉⲓⲥⲓⲥ <ēēteisis> for the standard ⲁⲓⲧⲏⲥⲓⲥ <aitēsis> (αἴτησις) in *BL Or.* 4866 (8th c. Djeme) 9.12 and ϩⲏⲣⲏⲥⲓⲥ <hērēsis> for ϩⲁⲓⲣⲉⲥⲓⲥ <hairesis> (αἵρεσις) from *Alexander Romance* (fr. 9v,16-21) which in addition to the /ai, e:/ confusion also displays confusion of /e:, e/. Finally, there is ϫⲏⲣⲓⲛ <kʰērin> from the Coptic and Greek standard ϫⲁⲓⲣⲉⲓⲛ <kʰairein> from *O.Frange* 8, 7. Note that all of these examples are much later than the Narmouthis Greek collection or any of the Fayymic Coptic collections in which there are no such examples. It is interesting because all of the attestations above have /e/ before a coronal consonant, and /r/ in this case seems to be raising the vowel quality, unlike what has in Chapter 4.2.2.4 been analysed to have possibly happened in *ektʰrōn*, but in line with possible coarticulatory processes with the nonstandard *strypʰēs* analysed in Chapter 4.2.2.3.

It seems obvious that the nonstandard variation of the vowel is following Greek phonological development because there are no earlier attestations, and at this point it had almost certainly raised to /i/ in mainland Greek. Regardless of this it is here in variation with αι <ai> which was phonetically /e/ so it seems that it was not raised to /i/ in Greek in Egypt in all positions. However, the articulation of η <ē> was almost certainly narrow in the examples above due to coarticulation, so it is possible that the raised quality of it was marked down with the more close variant depicting /e/, rather than using *epsilon* for this, which had the phonetic quality of /ɛ/ at this time, a more open variant.

More evidence on the retained /e/ quality of η <ē> can easily be found. *Codex Schøyen* has several examples of /e, e:/ confusion in various verbs in an almost idiosyncratic usage, e.g. ⲉⲡⲓⲧⲁⲥⲥⲏ <epitassē> for ⲉⲡⲓⲧⲁⲥⲥⲉ <epitasse> from Greek ἐπιτάσσω <epitassō> (6.16) and Alexandre Romance (fr. 8v,11) has ⲁⲙⲏⲣⲓ <amēri> for ⲁⲙⲉⲣⲓ <ameri> (the Greek standard being rather different, Ὁμηρῖται <omēritai>) and ⲙⲏⲗⲁ <mēla> (fr. 6v,13-15) for ⲙⲉⲗⲁⲛ <melan> (μέλαν). Girgis (1966: 77-78) has a few examples of this interchange in unstressed positions, and this is frequent in Narmouthis Greek ostraca. However, the bivalency of Coptic *eta* certainly seems to hold a part in this as in Greek loanwords, nonstandard variants for η <ē> range between ⲉ, ⲩ, ⲓ <e, y, i>, the latter two probably depicting /i/ but the first clearly /e/.

Consonantal surroundings often have a role to play in this as in the examples above, related to the adjacency of coronal consonants. Bala'izah (Kahle 1954: 54) offers examples of nonstandard depiction of ⲉ <e> as ⲏ <ē> where it even replaces the usage of the supralinear stroke. This provides evidence in addition to what has already been discussed prior to this: whether it was allophonic in nature or not, ⲏ <e:> seems to have retained at least in some positions the value of /e/ in Coptic, and not raised to /i/ alongside the Greek counterpart.

Layton (2000: 29) gives examples of the discrepancy between Greek and Egyptian syllable formation. He claims it was because of this that Sahidic Coptic sometimes used the supralinear stroke in words, to mark syllables whose apex did not contain a Greek vowel grapheme. These types of syllables did not exist in Greek which always had a vowel functioning as the syllable apex. Among the examples cited by Layton are syllabic consonants /l/, /p/, and /b/. This could be what is going on in <lebenous> whose vowels are all nonstandard – it is possible that the syllable peak was on /b/, and the surrounding vowels are simply assimilated to the quality of the consonant, /b/, a bilabial, able to lower the quality of close vowels, and raise the quality of open ones. It is of course possible that this was the case anyway even if one of these vowels performed as the syllable peak, but it seems all the more likely that this should be the case if there was focus on the articulation of the consonant (due to the 'consonant-rich'

nature of Egyptian), and the unstressed vowels followed suit. It has to be noted here, however, that according to Worrell (1934: 77-79) the Delta-Fayyum dialects (B, H=Bohairic and Fayyumic) were more characterised by prosthetic and helping vowels rather than syllabic consonants, probably because of a slower speech rate that allowed the pronunciation of full vowels (see also Kasser 1991c). The Northern valley, Central valley and remoter regions (S, A2, A=Sahidic, Lycopolitan and Akhmimic[68]), on the other hand, use syllabic consonants rather than prosthetic and helping vowels. In other words, it is not likely that we are dealing with syllabic consonants in the case of *lebenous* as the provenance of the text is Fayyum, where this type of phonological system was not prominent.[69] From this it has to be concluded therefore that even stressed syllables contain nonstandard vowel orthography, as all of the vowels in *lebenous* are nonstandard. Perhaps the quality of /a~e~i/ was simply so unstable in the continuum of closeness/openness that it was particularly vulnerable to the effect of adjacent consonants' quality. In the case of *lebenous,* it is probably, again, the effect of the bilabial on the surrounding vowels: the open vowel /a/ is raised in quality and the close vowel /i/ is retracted. Haspelmath (2015), mostly following the phonetic values of Coptic given by Loprieno (1995), believes the unstressed vowels' inventory to be limited to only schwa and /a/ (explained in more detail below). However, at least insofar as the treatment of Greek vowels is concerned this does not seem to hold true as unstressed /o/ is often replaced with <ou> /u/, as in the case of *lebenous* above. Admittedly, however, /i/ and /e/ seem to particularly be in flux, as evidenced already by the treatment of these phonemes in Section 4.3.3.

Coptic Detail: The phonemic quality of (ϵ)ι <(e)i> and ογ <ou>

Haspelmath (2015: 124), following the analysis of Loprieno (1995: 50), summarises the Coptic unstressed vowel inventory as follows:

> "There was a clear contrast between stressed and unstressed syllables in Coptic: Stressed syllables may have long vowels or the vowel [o], but unstressed syllables were apparently confined to the vowels [a] and [ə]. Where unstressed <e>, <i> and <ou> occur in writing, they were pronounced as [ə], [(ə)j], and [(ə)w]".

Haspelmath follows the long/short distinction of vowel quantity presented in Loprieno (1995: 46-48), instead of the theory of vowel quality from e.g. Peust (1999: 201-204) followed in this book. In effect this would mean that Coptic stressed vowel inventory consisted of ϩ <ē> /e:/, ѡ <ō> /o:/, ο <ο> /o/, (ϵ)ι <(e)i> /i:/, ογ <ou> /u:/, according to e.g. Loprieno; Loprieno also posits ϵ <e> /e/ and ⲁ <a> /a/ into the stressed vowel group. Loprieno's vowel inventory is fundamentally different from Peust's in for example counting /u/ as only a stressed vowel – it does not seem that way judging by

[68] Worrell uses the old abbreviations of dialects, according to which what is nowadays called Lycopolitan was formerly called Subakhmimic, believed to be a subdialect of Akhmimic. Nowadays this is not considered to be the case, so the name and abbreviation has been changed (from A2 to L). See e.g. Kasser 1991a and 1991b on description of the Coptic dialects and their grouping.

[69] Eitan Grossman (paper at Beyond Free Variation) has come forward with the opinion that Narmouthis (N) could be classified as an independent dialect form, apart from the Fayyumic dialects. Whether this has bearing on the linguistic system regarding the existence of syllabic consonants remains unclear before a more thorough analysis based on the hypothesis has been conducted.

the contrary evidence provided by Peust (1999: 250-254). Also the analysis in this book, presenting examples of /o, u/ allophony related to stress patterns, lends support to Peust's view.

The nonstandard writing forms in the Greek texts in OGN I are not typical of native language users' production, nor a part of the Greek phonological development, so they must stem from the second language users' native language structure. In these texts, as well as some Greek loanwords within Coptic texts, Greek unstressed /o/ is replaced precisely with /u/, indicating it to belong to the unstressed vowels' inventory.

Coptic proper aside, it at least seems that the vowel inventory described by Haspelmath does not apply to the graphic rendering of foreign words. For Greek words, the Egyptians tried to depict vowel quality as faithfully as possible, even if the graphemic form was not always remembered according to the standard. From what can be seen above with *lebenous*, it seems plausible that /i/ and /e/ did have a very weak quality and were particularly easily absorbed to the nearby phonemes' (most often consonants') quality; therefore, it seems logical that whenever phonetically possible, these could have been realised as a glide and a schwa in unstressed syllables. However, as seen in Section 4.3.2.3 and in 5.1.4, there are examples where Greek unstressed /o/ has been replaced with /u/ instead of /ə/, in other words those variants where the grapheme <o> or <ō> has been replaced with <ou> and not <e>. From these examples it can be deduced that Coptic had an unstressed vocalic phoneme /u/ in the phonological system, for surely it could otherwise not have been used in the graphic rendering of foreign phonemes.

In Chapter 4's examples of *pourou* (from *pyrou*) and *stryp^{h}es* (from *strop^{h}es*) there does not appear any phonetic possibility of squeezing in a glide in the middle of two consonants, which is the environment of the nonstandard vowels in these words. Furthermore, the names *Troeilou, Makrinou and Hermeinou* in Section 4.3.2.4 also give evidence, if phonologically-based, of some sort of distinction between vocalic /o/ and /u/ in the Coptic phonological system. They represent an equally unlikely position for <ou> to be realised as a glide as the grapheme appears word-finally and again after a consonant. In for example ⲑⲉⲩⲇⲱⲥⲓⲟⲥ <t^{h}eudōsios> in this chapter, the matter looks different, and after the vowel <e> /e/ the latter part of the nonstandard diphthong i.e. /u/ could well have been realised as a glide, if we do not take into account that this is already a nonstandard form from the standard Θεοδόσιυς <t^{h}eodósius> (again with the unstressed Greek /o/ in the second syllable having been replaced with /u/).

I suggest that stressed syllables and unstressed ones both had a vocalic /u/ in Coptic, dependent on the phonemic environment, and therefore <i> was probably also sometimes vocalic and sometimes consonantal. Depuydt (2003: 351-353) claims that the variation is partly conditioned by grammatical distinctions, the indefinite article ⲟⲩ <ou> /u/ being sonantic before nouns, but consonantic[70] when preceded by some prefixal elements, such as certain conjugation bases and prepositions. These are, for example, ⲉⲩ- <eu-> (prep., 'to a..') ⲁⲩ- <au-> (conjugation base of the perfect), ⲉⲩ- <eu-> (circumstantial converter). I am not sure that the distinction between vocalic and consonantic is anything but a phonetic "accident". Depuydt himself believes this to be a simple result of speech rhythm, <ou> being pronounced as /w/ in rapid speech and as /u/ in slower articulation.

Furthermore, Depuydt shows examples of this 'sonantic/consonantic' variation between two forms of the same verb: ⲥⲁϩⲟⲩ <sahou> 'curse' in absolute state

[70] Depuydt uses the term 'sonantic' instead of 'vocalic' because a part of his analysis concerns syllabic consonants. In this section, however, I have limited the commentation to these two semivowels and therefore use the distinction 'vocalic' vs. 'consonantic' myself.

(sonantic), and ϩ̅ⲟⲩⲱⲣ= <shouōr=> ('curse' in status pronominalis). There are other examples, but in all of them the same pattern actualises: it seems to follow the same rules in Coptic as in nonstandard renderings of Greek, be it Greek texts or Greek loanwords in Coptic. A symmetrical alternation between consonants and vowels seems to be what was wanted, the phonemes being realised as consonantal after or before a vowel and vocalic in between two consonants or a consonant cluster.

For example, the phoneme is consonantal in ϩⲓⲟⲙⲉ <hiome> /ˈhjomə/, where it precedes another vowel, but vocalic in ϩⲓⲙⲉ <shime> /ˈshimə/, where it is situated in between two consonants. In ⲫⲓ <fi> /fi/ it is again vocalic because a word consisting of only two consecutive consonants is difficult to pronounce, but consonantal in ⲫⲁⲓ- <fai-> /faj/, because it follows another vowel. So it seems that after or before vowels, it was probably realised as a glide in the spoken language (see also *Kleupis* in Section 4.3.2.3); it was probably all related to ease of articulation in spontaneous speech. No doubt this allophonic variation was used to create morphological distinctions in Coptic (maybe more so than conditioned by it), but it does appear to prove that both ⲉⲓ <ei> and ⲟⲩ <ou> had a vocalic realisation, contrary to what Haspelmath presents in his analysis of these two phonemes. And these phonological rules were probably used also in second language production.

5.1.6 A note on Coptic stress

Second language speakers have a tendency of transferring native language stress patterns onto the target language. For instance, an easy example of two languages with different stress patterns, one iambic (French) and the other trochaic (English) comes with English speakers pronouncing French *problème* with the stress on the first syllable and the French produce English *problem* with the stress on the second syllable, each second language user therefore according to their native language stress patterns. (Roy 2000: 16). Regarding research on Greek accentuation of foreign words and names, Clarysse states by and large the same by saying that

> "First and foremost, we should **not** a priori accept that Greek accentuation of foreign words followed the accentuation of the foreign language. In some languages this is indeed the case (e.g. Greek loanwords in Italian), but other languages simply apply their own accentuation rules to foreign words. French is a clear instance: any person using French knows he has to change the accent in his name when speaking that language: P**e**stman becomes Pestm**a**n in French, H**a**gedorn becomes Haged**o**rn, W**a**gner is Wagn**e**r when he happens to be from Strasb**ou**rg (Str**a**ßburg)." (Clarysse 1997: 178, emphases his.).

The same should be thought to apply to Coptic renderings of Greek words. It seems obvious that the Egyptian writers might have used L1 stress rules for the second language they were using i.e. Greek, but the problem in proving this has been the escaping nature of the Coptic stress system. Even so, I believe that some results for the Coptic stress system can be attained by analysing nonstandard orthographic variation of Greek loanwords in Coptic, more than likely to have undergone some sort of integration into native language phonology. Naturally, all languages have exceptions to a rule regarding linguistic structures, based on etymological forms, diachronic sound change etc., so irregularities will make a part of all linguistic structures. This does not mean, however, that a native language user is not conscious of certain tendencies that are more frequent than others, and these tendencies must form the basis of e.g. foreign

word/loanword integration. Therefore, even if there is no definite knowledge of Egyptian word stress and in native language words the application of it might have differed greatly from one word to another for language historical reasons, the Egyptians still must have had an idea of what the most typical patterns for word stress were.

These rules undoubtedly formed the basis of how e.g. Greek loanwords were treated when they were integrated into L1 phonology – the most common formation must have been used. For instance, Finnish is a language which prefers words to end in an open syllable i.e. a vowel. Even though Finnish speakers have no problems in pronouncing consonant-final words when speaking foreign languages, nor is it a problem in rapid connected Finnish speech (see Section 5.3), Finnish speakers nevertheless tend to insert a vowel (typically /i/) to the end of loanwords ending in a consonant. For example, the English loan 'beef' has become *pihvi* in Finnish, and even in spontaneous borrowing situations when an e.g. English word is used for effect in a sentence, it is typically phonologically integrated for the most part, including insertion of a word-final vowel. An example sentence given by a colleague reads: "pidä siellä tilaisuudessa vaikka joku *peippöri*" i.e. 'give some sort of a *paper* in the do' (Seppo Kittilä, p.c.), in which the final word, derived from English 'paper', has been integrated into Finnish phonology by replacing the English unstressed syllable's schwa with Finnish <ö> /ø/, and inserting a final /i/. The examples mentioned here concern L1 tendencies and frequencies regarding phonemes and phonotactics, but similar ones concern the stress placement of foreign words in Finnish: it is always on the first syllable as according to Finnish prosodic rules (['peip:øri]).

Somehow along these lines, tendencies based on frequency must have been at place in Egyptian prosody and affected the Greek loanword treatment, even if the stress system in Egyptian was not as clear-cut as that in Finnish. For trisyllabic words, the stress probably mostly lay on the second syllable, and for disyllabic ones either one was possible, but judging by the examples in Narmouthis Greek words, stress most frequently landed on the second syllable. This could have been affected by native language words taking either one of the stress positions. Coptic, at least, disfavoured the antepenultima (Peust, p.c.; Peust further says that Coptic words have either a final stress on a full vowel with all the other syllables as schwa, or penult stress with the final vowel as schwa). Sometimes the placement of Egyptian stress must have coincided with the Greek stress, as in e.g. στρυφης <stryp^{h}ēs>, second syllable stressed, and sometimes there was transfer of Egyptian stress on Greek words as in Κλευπις <kleupis>, stress (possibly) on the second syllable, original on the first (Section 4.3.2.3).

One possible interpretation for the irregularity of stress placement in disyllabic words is that Coptic stress lay on the heavy syllable. According to Nübling and Schrambke (2004: 284-285), stress-timed languages prefer stress placement in the heavy syllable and e.g. have positionally determined allophones and reductions, exactly as Coptic. This can apply to e.g. ⲙⲟⲭⲗⲟⲩⲥ <mok^{h}lous> because both syllables are heavy, but why the stress placement would have been necessary from the already working second syllable as heavy is a good question – did Egyptian prefer penultima to ultima or was the second syllable coda consisting of a fricative, often dropped word-finally in Greek in Egypt, seen as weaker in quality than the first one ending in a velar? ϣⲧⲟⲩⲗⲗⲟⲩⲥ <stoullous> has stress on the first syllable, if we follow the hypothesis of the nonstandard vowel displaying the unstressed syllable. If this is the case, according to the Greek original syllabification it lies on the light syllable and does not conform with the other examples, but the doubling of /l/ has to be taken into account here: it might be a graphemic-aid solution to the phonetic problem because with this modification, the syllabification changes and the first syllable is now heavy like the second one; in the original στῦλος <ˈstylos > the first is light and the second one heavy. Now the stress placement is the same as in ⲙⲟⲭⲗⲟⲩⲥ <mok^{h}lous>, in the first (heavy) syllable. The same goes for ⲙⲟⲩⲛⲁⲭⲟⲥ <mounak^{h}os> from the Greek μοναχός <monaˈk^{h}os>, again in line with the heavy syllable appearing to be the stressed one.

This is only a preliminary hypothesis and as investigating Coptic stress is not the focus in this study, a larger quantitative analysis will have to be left for a later time. However, those instances where the spelling is nonstandard can tell us something of possible Coptic stress patterns by looking at the quality of the vowels. In OGN I: 30 there is a nonstandard graphemic variant Ενπορος <enporos> for ἔμπορος <emporos> 'merchant'. Girgis, on the other hand, gives a variant in *Apoc*. 18:11 as ⲙ̄ⲡⲟⲣⲟⲥ <(e)mporos>. Coptic allowed <e> in unstressed syllables (Peust 1999: 251) but this could only be a graphemic representation of schwa. Girgis's example suggests that the first syllable with /e/ was unstressed according to the Egyptian stress system (cf. Peust on Coptic stress rarely on the antepenultima); as a matter of fact, as both of the /o/'s have been retained, it must mean that one of them was considered stressed. /a, e, o/ confusion was very frequent in word-final unstressed syllables and is not always reliable evidence for the actual vowel quality. The last /o/ was probably unstressed, leaving the penultima stressed, pronounced as [m̩ˈporəs]. This is similar in form to [kᵊˈrasən] in Section 4.3.1, so it seems that it is possible to deduce that with three-syllable words, Egyptian stress mostly landed on the penultima, a logical position for a stress-timed language (cf. the stress rules of English).

Peust borrows one of Girgis's examples, <sympʰōnein> 'to agree' being depicted as ⲥⲙⲫⲱⲛⲉⲓ <s(e)mpʰōnei>, phonetically /sm̩fōni/ i.e. /m/ is syllabic. Peust (1999: 250) suggests that in this word (again), stress was on the penultima, and is probably right. Further proof for disyllabic words containing stress in the second syllable are e.g. *Codex Schøyen horoma* from *horama* in 17,9 – this time the second syllable, where the stress probably lay in the Coptic system, has a replacement of the standard /a/ with /o/. *Codex Schøyen* contains an attestation of ϩⲟⲣⲟⲙⲁ <horoma> (Coptic standard the same) from Greek ὅραμα <ʰorama> where presumably the standard /a/ on the second syllable has been replaced with /o/ to indicate Coptic stress.

Crum (632a) also gives some very interesting attestations of insertion of ϩ <h> /h/ before /s/ in Greek words that seem to serve as further proof for the stress landing on the penultima. Crum gives three words: θάλασσα <ˈtʰalassa>, αἰχμαλωτίσσειν <aikʰmalōˈtissein>, and ὑποτάσσειν <hypoˈtassein> (the verbs are in active infinitive form as per Coptic convention of borrowing Greek verbs). In Coptic, these are written as ⲑⲁⲗⲁϩⲥⲁ <tʰalahsa>, ⲉⲕⲙⲁⲗⲱⲧⲓϩⲥⲏ <ekmalōtihsē> and ϩⲏⲡⲱⲧⲁϩⲥⲓ <hēpōtahsi>, respectively. There is nonstandard variation of another Egyptian-influenced kind in these words in e.g. replacing the aspirated velar with a non-aspirated one and an apparent avoidance of placing the short /o/ grapheme, *omikron*, on the unstressed syllable. But more importantly, all these Greek words have geminate <s> on the level of orthography which in Coptic is replaced with a <h-s> sequence. Greek had by this time become a stress-timed language so quantitative phonemic differences had largely disappeared – there was no real need in marking down geminate consonants, and often in Coptic renderings of Greek these have been simplified (see e.g. similar rendering of ὑποτάσσειν <ʰypotassein> as ϩⲉⲡⲟⲧⲁⲥⲉ <hepotase> in Girgis 1966: 80; numerous variants with a singleton /t/ in *holokottinos* and likewise singleton /m/ in *nummus* in Girgis 1966: 82) etc.

The sequence /h-s/ is difficult to produce distinctly, so it seems clear enough that the insertion of /h/ before /s/ is an orthographic clue as to the quality of the vowel before this, which by this notion could be seen as elongated, which is what a stressed vowel sounds like. In fact, /h/ is in some languages considered a voiceless vowel because while it may have a glottal place of articulation, it may have no frication i.e. the articulation of it remains a simple air flow; it is also easily assimilated to the place of articulation of vowels so it does not have a very distinctive place of articulation itself (Ladefoged and Maddieson 1996: 325-326; Ladefoged and Ferrari Disner 2012: 57). By some researchers, it is classified as an approximant and seen as "cover symbol" for a whispered or breathed onset to a syllable-nuclear vocoid of any quality (which explains the strong tendency to follow vowel quality). During the production of /h/, the vocal tract will already be in the position of the following vocoid, so for instance, the resonant quality

of [h] in e.g. *he* [hi] (in English) is that of a whispered [i], and *hoop* [hup] has a quality of [h] that anticipates the production of [u] (Laver 1994: 304-305). In addition, it is an oral consonant so production of it does not differ that much from vowels.

Using <h> as an orthographic marker to lengthen the duration of the previous vowel is logical on many accounts. The same orthographic principle is in use in e.g. Swedish, German, Maltese, English – a vowel-following /h/ means the quality of the previous vowel is long. These vowels were not long in Greek, but the stressed vowel is slightly longer in duration, so it would have sounded like that. On the other hand, opposite of what happens in the examples above i.e. simplifying the consonant duration, sometimes the consonant was nonstandardly geminated in what seems to be an attempt for similar purposes, i.e. to emphasise the stressed vowel in the word. This time the marker for stress comes before the stressed vowel instead of the inserting of <h> after the stressed vowel, and in the form of a geminated consonant. In my opinion, this could equally likely be tied to an adaptation of syllable structures according to perceived stress patterns, mostly in apparent transfer of Coptic stress.

An example of this is for example ⲡⲁⲗⲗⲁⲧⲓⲟⲛ <pallation> (Coptic standard) from παλάτιον <palátion> in *Vatican MS Copticus 69*, 125, in which the Greek stress seems to have been retained (the penultima position favouring this), and the doubling of the consonant possibly works as a cue to the second syllable stress. Similar examples are also found in ⲁⲙⲙⲏⲧⲓ <ammēti> from Greek εἰ μή τι <ei mḗ ti> (Coptic standard ⲉⲓⲙⲏⲧⲓ <eimēti>) in *Codex Schøyen* 11 and 27 (twice), *P.Bod. 6* (4, 14) ⲅⲉⲛⲛⲏⲙⲁ <gennēma> from Coptic standard ⲅⲉⲛⲏⲙⲁ <genēma> (Greek γένημα <genēma>), as well as *P.Bod. 6* (3, 17) ⲇⲟⲕⲕⲓⲙⲁⲍⲉ <dokkimaze> from ⲇⲟⲕⲓⲙⲁⲍⲉ <dokimaze> (Greek δοκιμάζω <dokimazō>). *P.Bod. 6* (3, 10, 12, 17) has ⲙ̣ⲁⲥⲧⲓⲅⲅⲟⲩ <mastiggou> from Coptic standard ⲙⲁⲥⲧⲓⲅⲟⲩ <mastigou> (Greek μαστιγόω <mastigoō>) which seems to be indicating the actual Greek stress position in the same way, leaving the stress on ultima. It seems that in all of these examples, except for ⲁⲙⲙⲏⲧⲓ <ammēti> and ⲙ̣ⲁⲥⲧⲓⲅⲅⲟⲩ <mastiggou>, in which stress happens to coincide with that of Coptic, the Greek original stress has been replaced by one that better suits Coptic stress patterns, i.e. placed on the penultima (except for ⲇⲟⲕⲕⲓⲙⲁⲍⲉ <dokkimaze>, which due to the length of the word, places the stress in the rare position for Coptic, antepenultima). Below is Table (14) showing these in phonological analysis.

Greek original	**Coptic nonstandard**	**Phonetic form of orthographic marking**	**Marker for stressed vowel**
θάλασσα <tʰálassa>	ⲑⲁⲗⲁϩⲥⲁ <tʰalahsa>	[tʰaˈlasa]	<h>/V_
ὑποτάσσειν <hypotássein>	ϩⲏⲡⲱⲧⲁϩⲥⲓ <hēpōtahsi>	[hepoˈtasi]	<h>/V_
αἰχμαλωτίσσειν <aikʰmalōtíssein>	ⲉⲕⲙⲁⲗⲱⲧⲓϩⲥⲏ <ekmalōtihsē>	[ekmaloˈtise]	<h>/V_
παλάτιον <palátion>	ⲡⲁⲗⲗⲁⲧⲓⲟⲛ <pallation>	[palˈlation]	<C:>/_V
εἰ μή τι <ei mḗ ti>	ⲁⲙⲙⲏⲧⲓ <ammēti>	[amˈmeti]	<C:>/_V
γένημα <génēma>	ⲅⲉⲛⲛⲏⲙⲁ <gennēma>	[genˈnema]	<C:>/_V
δοκιμάζω <dokimázō>	ⲇⲟⲕⲕⲓⲙⲁⲍⲉ <dokkimaze>	[dokˈkimaze]	<C:>/_V

Table 14. The realignment of Greek stress patterns using orthographic markers <h> and <C:>.

The interesting bit regarding the Coptic stress hypothesis presented in this chapter is that while the nonstandard Coptic renderings seems to repeat the original stress of e.g. αἰχμαλωτίσσειν <aikʰmalōˈtissein>, and ὑποτάσσειν <hypoˈtassein>, stress in, for instance, θάλασσα <ˈtʰalassa> is in Greek originally on the antepenultima. This seems to have been realigned to

lie on the penultima which was more suitable for Coptic, resulting in the nonstandard form ⲑⲁⲗⲁϩⲥⲁ <tʰalahsa>. The same phenomenon seems to be repeated in the addition of another orthographic marker for the stressed vowel, placing a geminate consonant before a stressed vowel, again in some cases producing a new stress pattern more in line with native Coptic, albeit again matching some of the Greek original ones. There are two things to consider in this. First, it is unlikely a native Greek writer would have moved the stress in the word so it seems like the phonetic form for these words came from L1 Egyptians; this goes toward establishing an (L2) Egyptian Greek variety, dealt with in more detail in Section 5.3. Second, the examples above also serve to prove that sometimes, quite often probably, the stress in Greek and Egyptian coincided so possible stress transfer from Egyptian to Greek was left unnoticed. Or, to put it another way, stress transference was not needed in the instances that suited native language phonology, but it was used when the stress position was awkward for Egyptian. Alternatively, /h/ could also be thought to have presented a glottal stop, creating hiatus between the preceding vowel and the following /s/, which could also be heard as an emphasis on the vowel (thus also marking a stressed vowel). The exploration of this, however, will have to wait until later time with more evidence of the phenomenon.

These are very good examples of the possible transference of Egyptian stress on Greek words. In the previous chapters I raised the issue whether the moving of stress relates to Egyptian influence or is based on authentic L1 Greek stress that had started shifting due to the change in the stress system. From the examples above, it rather seems like it is transfer of Egyptian stress, after all, as many instances seem atypical for native language users. In the next section I will demonstrate some of the same transfer phenomena in Arabic loanwords in Coptic, also deriving from the Coptic structures, but change of stress is not well presented in them. This might be because the stress systems of the Arabic and Coptic were more similar than those of Greek and Egyptian, especially as the change had only started in Greek not long before OGN I.

The importance of stress in Egyptian for (vowel) phonemic value can also be seen when looking at some attestations of the /e, i/ variation. According to Girgis, unstressed /i/ usually held its value in Greek loanwords in Coptic but in some instances, albeit rarely, it could vary with <e> as in ⲗⲉⲅⲉⲱⲛ from <legiōn> ‘legion’, and in some cases further on with the supralinear stroke, as in ϭⲛ̄ⲧⲉⲛⲉⲩⲉ for the standard Greek κινδυνεύειν <kindyneuein> (Girgis 1966: 79). On the other hand, also stressed /i/ could vary with all of the graphemes mentioned for the unstressed one, and likewise with ⲉ <e>, although even more rarely than in unstressed syllables; but again, even the vowel stroke can replace /i/ as in ⲕⲛ̄ⲧⲏⲛⲟⲥ <kᵊntēnos> for the Greek standard κίνδυνος <kindynos> (Girgis 1966: 89). It can therefore be concluded that although /i/ could become subject to variation if it was in a weak position, it was nevertheless capable of sustaining its quality even in unstressed syllables. However, looking at ϭⲛ̄ⲧⲉⲛⲉⲩⲉ <kʲᵊnteneue> ‘run risk’ and ⲕⲛ̄ⲧⲏⲛⲟⲥ <kᵊntēnos> ‘danger’, it becomes apparent that what was most important for Greek vowels to be able to retain their quality in Egyptian texts was the stress position of the vowel, not whether it was a match for Egyptian phoneme distribution. Both of these words seem to have the word stress somewhere other than the first syllable, although in the latter, it is supposed to be there according to Greek standard – in both words, /i/ has been replaced with the supralinear stroke usually reserved for schwa, the ultimate unstressed vowel. It seems, therefore, that Egyptian stress rules could have been applied here, as otherwise stress would have landed on the antepenultima, a difficult position for an L1 Egyptian speaker.

To provide an estimation, based on the only surviving vowels from the original, I would say the stress in ⲕⲛ̄ⲧⲏⲛⲟⲥ <kᵊntēnos> was on the ultima and in ϭⲛ̄ⲧⲉⲛⲉⲩⲉ <kʲᵊnteneue> on the penultima. Boud’hors (2017: 437) has also found several variants on κίνδυνος <kindynos> in her study of ca. 200 Fayyum documentary texts (Boud’hors 2017: 424): ⲕⲓⲛⲧⲏⲛⲟⲥ <kintēnos>, ⲕⲏⲛⲧⲓⲛⲱⲥ <kēntinōs>, ⲕⲏⲛⲧⲉⲛⲱⲥ <kēntenōs>, ⲕⲓⲏⲛⲧⲉⲛⲱⲥ <kiēntenōs>, ⲕⲩⲛⲧⲉⲛⲟⲥ

<kyntenos>. From all of these it looks like the quality of the first two syllables seems uncertain, and it can even be the case that as in *lebenous*, the syllable peak rests on a consonant and not a vowel – however, evidence from the last syllable seems to add to my hypothesis as it has always retained /o/, albeit using two different graphemes for it, so at least that syllable does not appear to be treated as unstressed in any of the examples. The texts are late, so variation between /i, eː, e, y/ is probably mostly due to *iotacism* at this point, although remnants of the Coptic allophony between /i, e/ are still visible in e.g. ⲕⲏⲛⲧⲉⲛⲱⲥ <kēntenōs>, ⲕⲓⲏⲛⲧⲉⲛⲱⲥ <kiēntenōs>, and ⲕⲩⲛⲧⲉⲛⲟⲥ <kyntenos>, where /i/ in the second syllable has been replaced with /e/, for reasons that are at least in this context phonetically unclear.

Κλευπις <kleupis> from OGN I analysed in Section 4.2.2.3 had one standard and one nonstandard vowel, so logically speaking, the nonstandard one should be thought to be the unstressed one. This is not what it is in Greek. This is an instance where Eyptian stress rules might have been used in the usage of Greek: according to these, the phonetic form of the word was [kleuˈpis], and by this interpretation the stress is on the light syllable. If syllable weight is taken to be conclusive in the positioning of Greek stress, then perhaps it should be thought that stress in Κλευπις <kleupis> is on the first syllable, it being heavy, as it is in the Greek original. In that case unstressed syllables cannot be thought to be the ones carrying nonstandard vowels. It goes without saying that isolated examples such as these obviously cannot be used to prove a phenomenon but they are enough to establish a preliminary hypothesis which is in line with the findings of e.g. Allen (2013: 12-13, 24) about the stress patterns in Coptic. It is not possible to gather more evidence in the scope of this study, but with a larger quantity of nonstandard Greek words and Greek loanwords in Coptic, the stress position and its relation to Egyptian prosodic patterns can probably be narrowed down in a later study. With this preliminary study it can, however, be seen that however different strategies were used to mark Coptic stress with the aid of nonstandard orthography, the results are largely the same: in disyllabic words, the stress seems to have landed on either one of the syllables, perhaps related to which one was the heavy one, and in trisyllabic words, the stress mostly landed on the second syllable (penultima).

5.1.7 A note on language attitudes

In Chapter 3 I presented the additional factor of language attitudes contributing to the vast orthographic variation in texts written by Egyptian scribes, referring to the mostly visually pleasing-based tradition of text composing in Egyptian deriving from the Middle Egyptian hieroglyphic writing tradition. It seems that this tradition received a direct continuation in Demotic Egyptian, where quite often the consonants of a word were written down in a different order than was their standard for no apparent reason (see examples of this in the writing forms of Egyptian personal names in e.g. *Demotisches Namenbuch*). It is also believed by researchers of Medieval English scribal work that variation in itself was of value to the writers of the manuscripts. The same type of what seems like craftsmanship seems to be evident in many of the texts written by Coptic scribes, and e.g. varying writing forms of the same words are plentiful. The most illuminating example of this practice, however, comes from *Codex Schøyen*. It is entirely likely that often, the different orthographic variants are not intended but merely a result of the flexible attitude in especially the lower standard of documentary texts and private letters etc., and without asking the scribe himself it is not possible to state anything definite of the ideas behind this habit. However, the examples below certainly look like an intention in the writing because of the repeated pattern of non-identical pairs of a few words.

The scribe of *Codex Schøyen* has several pairs of a word being written in two different graphemic alterations, each producing the same phonetic form (the exact quality of <ē> and

<e> are not taken into account in the analysis of these examples because the scribe does not seem to differentiate between them, as stated earlier), within close proximity to one another, so that random variation does not seem an option; this seems like a deliberate means of distraction to keep the scribe entertained with his own work. Such pairs are presented in Table 15 below.

	Nonstandard	Phonetic form	Standard/phonetic	Greek original	Place in text
(15)	ⲉⲧⲓ <eti> ⲁ̣ⲓⲧⲉⲓ <aitei>	/eti/ /eti/	ⲁⲓⲧⲉⲓ <aitei> /eti/	αἰτέω <aiteō> ‘ask, beg’	5, 42 6, 8
(16)	ⲛⲏⲥⲧⲉⲩⲏ <nēsteuē> ⲛⲏⲥⲧⲉⲟⲩⲏ <nēsteouē>	/nesteue/[71] /nesteue/	ⲛⲏⲥⲧⲉⲩⲉ <nēsteue> /nesteue/	νηστεύω <nēsteuō> ‘abstain from’	6, 16 6, 17-18
(17)	ⲁⲅⲁⲓⲗⲏ <agailē> ⲁⲅⲉⲗⲏ <agelē>	/agele/ /agele/	ⲁⲅⲉⲗⲏ <agelē> /agele/	ἀγέλη <agelē> ‘herd (of horses)’	8, 32 8, 30
(18)	ⲡⲟⲗⲉⲓⲥ <poleis> ⲡⲟⲗⲓⲥ <polis>	/polis/ /polis/	ⲡⲟⲗⲓⲥ <polis> /polis/	πόλις <polis> ’city’	8, 33 9,1
(19)	ⲁⲣⲛⲉⲓ <arnei> ⲁⲣⲛⲓ <arni>	/arni/ /arni/	ⲁⲣⲛⲁ <arna> /arna/	ἀρνέομαι <arneomai> ‘deny, disown’	10, 33 10, 33
(20)	ⲕⲉⲗⲉⲩⲉ <keleue> ⲕⲉⲗⲉⲩⲏ <keleuē>	/keleue/[72] /keleue/	ⲕⲉⲗⲉⲩⲏ <keleuē> /keleue/	κελεύω <keleuō> ‘urge, drive on’	18, 25 19, 7

Table 15. Pairs of orthographic variation within the same phonetic form.

In addition to these, there are a number of other similar pairs with greater distance between them, but displaying the same character of a different orthographic but a matching phonetic form. I am focusing on the ones which follow each other in rapid succession, however, because it is at least unlikely that when a word is repeated in the same or the following line, the orthographic form of it would not be remembered. Variation in itself might have been, therefore, what the scribe was aiming at.

In (15), ⲉⲧⲓ <eti> and ⲁ̣ⲓⲧⲉⲓ <aitei> (the last one being the standard) there is only minimal variation, /ai/ being written with ⲉ <e> in the first occurrence of the word – the same goes for (18) ⲡⲟⲗⲉⲓⲥ <poleis>/ⲡⲟⲗⲓⲥ <polis> and (19) ⲁⲣⲛⲉⲓ <arnei> and ⲁⲣⲛⲓ <arni>. The standard in Coptic is ⲁⲣⲛⲁ <arna> from Greek ἀρνέομαι <arneomai>, but this is based on the Sahidic tendency to end open syllables in *-a*, whereas Mesokemic dialects ended it in *-i/e*. In (16) ⲛⲏⲥⲧⲉⲩⲏ <nēsteuē> and ⲛⲏⲥⲧⲉⲟⲩⲏ <nēsteouē> from the standard ⲛⲏⲥⲧⲉⲩⲉ <nēsteue>, as well as in (20) ⲕⲉⲗⲉⲩⲉ <keleue>/ⲕⲉⲗⲉⲩⲏ <keleuē>, the scribe has taken what seems to be his default grapheme, ⲏ <ē>, for marking a general open to close-mid front vowel i.e. /e/. Allen (2013: 12)

[71] In Coptic this was more likely /nestewe/ as <ou> was allophonic between /u/ and /w/, depending on the position of it in the word (Layton 2000: 17-18; Depuydt 1993: 353-354).
[72] Pronunciation level as in <nesteue>.

posits the values between the two /e/ graphemes so that ϵ <e> has the phonemic value of /ə/, and н <ē > is /e/. Given the high tendency of unstressed /e/, normally depicted with the grapheme ϵ <e>, to lose its quality in Coptic and become centralised, it is possible that this is how the Egyptian writers would see things, that *eta* would function as the "/e/ proper". Knowledge of Greek retaining the actual phonetic value of /e/ word-finally might actually have encouraged some writers to choose the grapheme that carried the clearest connotation of /e/ with it, i.e. *eta*, for writing out these types of Greek words.

In addition to this, the standard diphthong /eu/ has in (16) been written in a way that is frequently seen even in native Coptic texts, with ϵ <e> + oγ <ou>, which of course is pronounced in the same way as ϵγ <eu>. Last, (17) ⲁⲅⲁⲓⲗⲏ <agailē> and ⲁⲅϵⲗⲏ <agelē> (the latter the standard) only have the depiction of /e/ apart, in the first version written with ⲁⲓ <ai> /e/, a very common spelling mistake in any Greek documents of this time.

Given the minimal distance of the nonstandard variant to the standard one, a picture emerges of intentional variation of the kind that can also be seen in the texts of Medieval English scribes. However, while I believe that this might be true of this particular scribe's language use and writing habits, in many cases variation was probably non-intentional, and merely a result of lack of interest for standardisation on such level that is regular in modern times. The scribe of *Codex Schøyen* wrote in the Mesokemic dialect, which received standardisation in the same period it was used, apparently to a high level (Anne Boud'hors, p.c.). As mentioned before, this codex is a free copy, similar to *P.Hamb.bil. 1*, even though the handwriting is on a professional level. However, possibly because this freedom from official guidelines allowed it, variation could have been intentional simply for the sake of amusement. Nevertheless, there is an interesting parallel in Middle English dialectal language use, studied by Laura Wright (2009).

Before standardisation of English, scribes would often spell words according to their own dialectal variation. This means that there was no official standard of a given word, nor that all the words were necessarily written in their dialectal form, but the system was one of "controlled variation", and the scribes usually had a major variant. For instance, in guild certificates from Norfolk (November 1388 - February 1389), there were 144 instances of the third person plural form of *shall* in forty ways of spelling these, divided to three major variants: *u/o* + *n* variants - *shullen, sshullen, scholen* etc. (44%), *u/o* variants - *shule, sul, shole* etc. (32%), and *a* - *shal, sal, schalle* etc. variants (23%). Wright comments on the fact that there was nothing wrong about this, nor was it a sign of lack of education. Apparently, Medieval East Anglian clerks were particularly prone to spelling variation, more so than in other counties. By contrast, within the same exact text type (guild certificates) in London, within the same four months as in Norfolk, there were only five different ways of spelling third person plural *shall*: *schul* (80%), *shul* (9%), *schulle* (5%), *schal* (4%), *schule* (2%) – 96% *u* variants and only 4% *a* variants. The London scribes were further along in the process of elimination of variation i.e. standardising the language, proven by the high percentage of one of the variants (*u*), whereas the Norfolk scribes still maintained the normal medieval practice at this date with three main variants with little distance between them. According to Wright, this was nothing extraordinary – consistency was not considered a virtue in Middle English writing, and minority variants were, in fact, used as stylistic 'fingerprints' to encode information about the variation in the writer's speech. As such, they were not viewed as errors, or, in fact, insignificant. (Wright 2009: 149-151).

The same carefree approach is seen in many Coptic texts, such as *Codex Schøyen*, as well as in (especially) documentary texts produced also in Greek, for example in the Narmouthis temple documents. Quite simply, the contents were more important than a careful administration of the orthographic standard, and with some writers you could even say that the standard was that of no-standard (applied equally to spelling mistakes as well as case inflection), so much so, in fact, that intentional variation for the sake of variation seems to be the underlying cause for it. This could, perhaps, be somewhat compared to the standards of

modern day academic writing, in which it is important for stylistic reasons to avoid using repetition of words and phrases, in order to make the text more comfortable to the reader and keep his/her interest up. In the case of Narmouthis Greek ostraca, the underlying cause was probably the lack of mastering the Greek standard due to the scribe apprentices' imperfect learning of it, combined with some transfer elements of the L1WS. If L1WS effects partially came from Coptic, as I will try to prove to what is the possible degree provided by the available evidence in Dahlgren (in prep. (a)), this probably added to the insecurities on the level of writing because of the generally early date of using Coptic WS, regardless of the dialect, in which standardisation was very much in process. Be that how it may, the huge amount of variation in these ancient texts makes a statistical analysis very difficult to perform as the standard by comparison escapes under so many different phonetic spellings, or other variation, of the same word.

5.2 Arabic loanwords in Coptic

The Arab conquest of 641 CE changed the linguistic setting in Egypt in the sense that what had been by and large a bilingual contact situation between Greek and Egyptian now became dominated by the effect of Arabic, slowly ending in total language shift to Arabic and death of Coptic (Richter 2006: 495; Richter 2009: 417-434 gives a detailed description of the process, much related to language change in Christian text production). There are still large amounts of unpublished Coptic and Arabic papyri so numbers may rise, but according to the calculations of Richter, a compiler of a database of Arabic loanwords in Coptic, there are approximately 500 Arabic loanwords in Coptic. Most of these are nouns, but a surprisingly large number, more than 25 types of Arabic verbs, have been found by Richter (Richter 2015: 227-228; Richter 2017: 514).) There is an easy explanation to this seemingly surprising result, and that is that while there are also some documentary texts including even letters written in Coptic that have Arabic loanwords in them, a substantial portion of all Arabic loanwords come from alchemic texts and alchemy as a subject, naturally, belongs to the realm of doing more than anything else (Richter 2009: 422-423; 2015: 227-228). The reason Arabic loanwords in Coptic are analysed in this work is the following: they provide a parallel line of analysis to how foreign linguistic material was integrated to Coptic, besides Greek.

The phonological impact of Egyptian on Greek can to some extent be verified by a phonological analysis of Arabic loanwords in Coptic, which show similar traces of transfer from the recipient language. First, tendencies of the same nature to the Greek usage of Egyptian scribes can be seen all over in the Arabic loanword treatment: underdifferentiation of foreign phonemes, phoneme distribution according to L1 prosodic rules, and replacing L2 phonemes with native language ones. Second, it is very clear that again, both phonetic and phonological motivations are at play in the formation and orthographic rendering of the loanwords. Arabic and Coptic were both stress-timed languages as well as part of the same language family, therefore being structurally more similar to each other than Greek and Egyptian, so their prosody and syllabic divisions matched each other well. Henceforth, there is not the same amount of transfer of Coptic stress evident in Arabic loanwords in Coptic as there was in the L2 treatment of Greek words by Egyptian scribes. However, surveying the Arabic loanwords in Coptic, it becomes immediately clear that coarticulation of phonemes is as dominant a feature in Arabic as it is in Egyptian, and this can be seen in the Coptic transcriptions of Arabic loanwords, displaying similar variation to that present in the Greek of the Narmouthis ostraca.[73]

It is notable that good care was taken in trying to remain faithful to the source language phonology within the limits that were possible regarding different writing systems and phoneme-grapheme inventories. There is little difference in the way Arabic was transcribed to how Greek was, the latter within the same alphabetic writing system; again, as discussed in Section 3.2, having different writing systems is not necessarily as big an obstacle as previously believed to understanding and recoding a foreign language.

Richter has compiled the known Arabic loanwords in Coptic and presents examples of these in Richter (2006), (2009), and (2015), in (2006: 496-497) analysing the consonantal variation. It is interesting to see how e.g. Arabic velar and uvular stops' phonetic level is differentiated by using the aspirated velar stop grapheme ϫ <k^h> from the Greek alphabet for the first and the regular velar stop ϰ <k> for the latter, in this way creating a distinction between a 'dull' and a 'brighter' pronunciation for these in Arabic separate phonemes that did not exist in Coptic. The stage of Arabic discussed here is a spoken contemporary colloquial, not Classical Arabic, from 9th to 11th centuries, in the context of alchemy, and written in a "relatively informal orthography", closer to the vernacular than literary compositions (Richter 2006: 496). Blau

[73] Arabic loanwords have been transliterated into Latin alphabet by Richter.

(1979: 215) has classified a similar text, Arabic written in Coptic alphabet from the 13th century, as Middle Arabic Substandard meaning "some kind of classicized Middle Arabic" and " Semi-classical Middle Arabic" (Blau 1979: 215 fn. 2), categorising it to the type of mediaeval Christian Arabic.

Vowel coarticulation is a prominent feature in the Arabic loanwords analysed in this section. Accordingly, also Blau speaks of extensive realisation of *imāla* in his text of the same time and type. *Imāla* is the Arabic linguistic term for the effect of consonantal coarticulation on vowels, meaning a vowel shift from /a, a:/ to /e, e:/ everywhere but near the emphatic consonants, uvulars, (to a lesser degree) the pharyngeal consonants /ħ/ and /ʕ/, and /r/ (Blau 1979: 222).

The level of pronunciation can be seen everywhere in the Coptic transcriptions of the loanwords. They are spelled similarly to many of the nonstandard writing forms of Greek words, i.e. the phonetic level forms a basis for the graphemic level. For example, *al-qārūra* 'flask' is written as ⲁⲗⲕⲁⲣⲟⲟⲣⲉ <alkaroore> in Coptic (loanword in Richter 2009: 425.). As Richter (2006) has already given an analysis of the consonantal correspondences between Coptic and Arabic orthographic conventions, in this section I concentrate on the primary subject matter at hand, i.e. what can be said about the quality of Coptic vowels based on the transcriptions of them in Arabic.

Below are some of the most typical examples of how these phonological/phonetic phenomena were represented on the graphemic level. As discussed in Section 3.3, L1 transfer on loanwords has mostly been considered to be either phonological or phonetic within the field of loanword phonology, but in the case of Arabic loanwords in Coptic it is evidently clear that it is both phonological and phonetic, as discussed in Chapter 4 (Introduction). It takes into account both the phonetic realisation of spoken Arabic, as used by native speakers, for instance the assimilation of the liquid of the article *al-* into the quality of the initial consonant of the following noun according to the Arabic phonological rules concerning this (the so-called *Sun and moon letters*). Another phonetic factor is also clearly visible in the graphemic renderings of these word in Coptic, namely the Arabic coarticulation rules, i.e. how consonants are divided in terms of their effect on the nearby vowel, i.e. whether it is raising or retracting. Therefore, perception of the foreign language as spoken by the native speakers has formed a part of the nonstandard, near-phonetic depiction of the loanwords.

On the other hand, the divide between phonology and phonetics is again problematic because some of the features that are here classified as phonetic are related to the phonological structure of Arabic, albeit the spoken language outcome of them can be considered to be phonetic. For instance the coarticulatory effect of consonants on vowels serves the function of giving immediate information on the quality of the consonants in the word through the quality of the vowel, which allows for a quick separation of e.g. the pharyngealised and coronal stops /dˤ, tˤ/ and /d, t/ in rapid spoken language. The same applies for features stemming from Coptic phonology: for instance the allophony of /o/ and /u/ according to Coptic stress patterns is a feature related to the phonological structure of the language in terms of phoneme distribution, but again the outcome of it in spoken language seems phonetic because it is tied to the effect of the stress in the word: quite simply, the mid vowel /o/ cannot as easily hold a distinct phonetic value in an unstressed position, it will be easily reduced to schwa, whereas /u/, a close vowel, is easier to distinguish in any position. It seems, therefore, that what are phonetic features of a language, become phonological rules if they have significance regarding the phonological structure of the language. For Afroasiatic languages, determining the consonant quality quickly is essential because word-formation relies on a consonant root; this is the basic principle behind the Arabic phonological rule regarding coarticulation.

To begin with, it is clear that as in L2 Greek usage, some of the most common words are memorised, so for example the article is always written according to Arabic standard

orthography, <al>. Second, in the first word ⲁⲗⲕⲁⲣⲟⲟⲣⲉ <alkaroore>, the first syllable stop is indicated to be a uvular one as it is in Coptic written with ⲕ <k>. Third, the phoneme distribution of the Coptic stress system has been taken into account in writing the second syllable Arabic <ū> with ⲟⲟ <oo> in Coptic. This is a particularly interesting example as the stress in Arabic should be on the <ū> so it is in Coptic marked with ⲟ <o> to indicate a stressed round vowel in accordance with native language phonological rules. It is also marked with two of these graphemes, which seems as plausible proof for the Coptic phoneme distinction between the Greek long and short vowel graphemes ⲟ <o>, ⲱ <ō> and ⲉ <e>, ⲏ <ē> to be one of quality, not quantity, as suggested by Peust (Section 2.3) because for some reason, the writer of the word has seen it fit to write to consecutive <o>'s as if marking vowel length: this is, according to Richter (2017: 520) a frequent practice in Coptic transciptions of Arabaic words with long vowels. This phoneme was long in Arabic so it seems unlikely it would have received an interfering glottal stop in between two short vowels by way of modifying the phonemics to Coptic, as this double grapheme has been traditionally understood to be indicating within Coptology; at least the double grapheme does not seem to indicate glottal stop at this time in Coptic (see Section 2.1.3 on discussion of Coptic vowel quantity/quality; see also critique against the vowel quality hypothesis in Richter 2017: 520). Futhermore, there was ⲱ <ō> available for marking a long /o/ if this was its function. Last, the Arabic wordfinal /a/ is in the Coptic version written with ⲉ <e>, as in so many of the apparent schwas in the Narmouthis Greek word-final unstressed syllables considered in Section 4.2.1.

Similarly, ⲁⲗⲙⲁⲧⲕⲁⲗ <almatkal> from Arabic *al-miṯqal* 'weight of one dînâr' shows coarticulation on the choice of the stop grapheme quality, again presented with ⲕ <k> to depict a uvular stop. In addition, the 'emphatic' /t/ <ṯ> has changed the quality of the Arabic original <i>, in Coptic written with ⲁ <a> to better describe the phonetic reality i.e. the retraction of the vowel adjacent to a pharyngealised consonant. Finally, the graphemic marking of the Arabic uvular stop is repeated in the last syllable marking it with Coptic ⲕ <k>.

The standard Arabic *al-kātib* 'scribe' has in Coptic taken the form ⲁⲗⲭⲉⲑⲓⲡ <alkʰetʰip>, in which can be seen how the Arabic velar stop's quality is in Coptic depicted to differ from that of the uvular, using the grapheme ⲭ <kʰ> for the velar stop. /a/ has also faithfully raised to /e/ in between the velar and the coronal, both part of the group that cause *imāla*. Again the voiced stop has also been replaced with a voiceless one as according to Coptic phonology.

ⲁⲣⲣⲱⲡⲁ <arrōpa> from the Arabic standard *al-rūbʿ* 'quarter (a measure)' has many phonetic phenomena in the one word. First, the assimilation of the /l/ in the article to the initial consonant of the following word (/r/) has taken place, because both of the consonants are coronals as per the Arabic rule for article assimilation dictates. Second, again the Arabic (stressed) /u:/ has been replaced with /o/ in the Coptic rendering of the word, albeit this time with <ō>, which was the close variant for /o/ in Coptic, i.e. [o], <o> being phonetically more open i.e. [ɔ]. Perhaps this is of significance. In ⲁⲗⲕⲁⲣⲟⲟⲣⲉ <alkaroore> from *al-qārūra* the same replacement of (stressed) /u/ has taken place but a different vowel grapheme has been chosen for the task, *omicron* [ɔ] instead of *omega* [o]. In *al-qārūra* /u/ is situated in between two /r/'s in addition to which the preceding syllable has a uvular stop /q/. Thus, there are many factors to cause retraction on the vowel, perhaps then by listeners (i.e. the writers of the Coptic text) perceived as [ɔ]. In *al-rūbʿ*, on the other hand, /u/ occurs after /r/ but before /b/, which belongs to the group of consonants that actually raise vowel quality. Therefore, perhaps it was perceived as the closer variant [o]. In addition to all this, there is a word-final *ayin* in the Arabic original, for which has been chosen the grapheme <a> for understandable reasons, *ayin* being phonetically a voiced pharyngeal fricative ([ʕ] or an epiglottal/pharyngeal trill/fricative [ʢ]), produced with the tongue root against the back of the throat. In other words, its place of

articulation is very low within the vocal tract and therefore might sound similar to the most open vowel sound to someone who does not have the sound in his/her native language.

Arabic original *al-qabāla* has received the written form of ⲁⲗⲕⲁⲡⲉⲗⲉ <alkapele> in Coptic. There is nothing new to this nonstandard form in terms of phonetic or phonological processes but it is a perfect example of the *imāla.* /a/ has been retained after the uvular consonant in the Coptic form of the Arabic loanword, whereas both other remaining /a/'s have raised to /e/ in the environment of non-retracting consonants.

Finally, an example of a word in which the phonetic form of the word does not materialise in perfect accordance with the Arabic phonological rule. In ⲇⲉⲣϩⲁⲙ <derham> from the Arabic *dirham* 'dirham', the first syllable retraction of /i/ to /e/ is in keeping with the phonological rule of vowel retraction, i.e. taking place before /r/. In disyllabic Arabic words, the stress should always land on the first syllable. However, in the second syllable /a/ should have been raised to /e/ in the consonantal context but it has been preserved in the Coptic writing as <a>. According to Blau (1979: 225) the prevention of *imāla* was only marginal in the text he was processing, i.e. in the context of /h/, /a/ was almost always raised to /e/. I therefore believe that it is entirely possible that <a> in the second syllable does not in fact mark an open vowel quality but is a Coptic orthographic means to marking a word-final schwa. The vowel was unstressed and in an environment that phonetically might have kept the value open (and retracted a close vowel value), in between /h/ and /m/ (see discussion on these in previous chapters, /h/ in Section 5.1.6 regarding Greek loanwords in Coptic, and Section 5.1.4 for the effect of bilabials on vowels). The same phenomenon is repeated at least in the marking of Arabic standard *dānaq* as ⲧⲁⲛⲉⲕ <tanek> in Coptic. The second syllable uvular /q/ should cause the original vowel value of /a/ to be retained but it seems to have raised to /e/. <a> was one of the vowel graphemes with which schwa was orthographically marked in Coptic but <e> was even more frequent for the purpose. Therefore it seems that whatever the unstressed vowel's value in Arabic original, the final unstressed syllables were treated within the rules of Coptic phonological system, and marked accordingly using Coptic orthographic practices, exactly as second language Greek and Greek loanwords in Coptic were treated.

There seems to be supporting evidence, therefore, from the treatment of Arabic loanwords in Coptic to indicate Egyptian influence on the nonstandard vowel usage in Narmouthis ostraca. Retraction of vowel quality to match the quality of back consonants seems to be to a large extent a shared feature of both Arabic and Egyptian, probably deriving from the same need to enhance consonant quality for the sake of clarity in word formation patterns, relating to the consonant root formation behind words in these languages. Nevertheless, not all nonstandard features in these Coptic renderings of Arabic are explainable through the phonological system of Arabic, similar or not to that of Egyptian. Other type of variation already envisaged in previous chapters regarding nonstandard Greek usage is similar in these Arabic loanwords, standard <ou> being replaced with <o> in a stressed syllable, word-final unstressed vowels marked as schwa using Coptic orthographic practices, the usual voiced and voiceless stops' treatment following Coptic phonology. Therefore, when there is only one common factor between the nonstandard usage of Greek loanwords in Coptic as well as that of Arabic loanwords, again in Coptic, it is reasonable to deduce that the source of variation in both instances was the Egyptian language.

Arabic original	Coptic transcription	Coarticulation/Phonetic	Stress marking/Coptic
al-qārūra	ⲁⲗⲕⲁⲣⲟⲟⲣⲉ <alkaroore>	Grapheme for velar stop /k/ = ⲕ <k> marking down Arabic uvular /q/. Retraction of /a/ to [ɑ] adjacent to uvular stop. Retraction of /u/ to /o/ before /r/.	Arabic stressed /u/ marked with /o/: Coptic orthographic practice marking stressed round vowel with <o>. Arabic vowel length marked with double <o>. Word-final unstressed vowel marked like Coptic schwa, with <e>.
al-mi<u>t</u>qal	ⲁⲗⲙⲁⲧⲕⲁⲗ <almatkal>	Grapheme for velar stop /k/ = ⲕ <k> marking down Arabic uvular /q/. Retraction of /i/ to [ɑ] adjacent to pharyngealised stop. Retraction of /a/ to [ɑ] adjacent to pharyngealised stop.	
al-kātib	ⲁⲗⲭⲉⲑⲓⲡ <alkʰetʰip>	Grapheme for aspirated velar stop /kʰ/ = ⲭ <kʰ> marking down Arabic velar stop /k/. Raising of /a/ to /e/ adjacent to a velar stop. Grapheme for voiceless bilabial stop /p/ = ⲡ <p> marking down Arabic voiced bilabial stop /b/.	
al-rūbʿ	ⲁⲣⲣⲱⲡⲁ <arrōpa>	Retraction of /u/ to /o/ after /r/. Arabic *ayin* marked with ⲁ <a> /a/. Assimilation of article /l/ to /r/ adjacent to a coronal consonant.	Arabic stressed /u/ marked with /o/: Coptic orthographic practice marking stressed round vowel with /o/ (here <ō>).
al-qabāla	ⲁⲗⲕⲁⲡⲉⲗⲉ <alkapele>	Retraction of /a/ to [ɑ] after a uvular. Raising of /a, aː/ to /e/ near /b/ and /l/.	
dirham	ⲇⲉⲣϩⲁⲙ <derham>	Retraction of /i/ to /e/ before /r/. Retraction of /a/ to [ɑ] after /h/?	Possible vowel reduction matching the Coptic orthographic rules in unstressed syllable; first syllable stressed, /h/ within consonants that should raise /a/ to /e/. <a> marks a schwa as is frequent in Coptic?

Table 16. Arabic loanwords in Coptic, coarticulation and stress-related allophonic distribution.

In addition to the consonant qualities analysed by Richter (2006), the vowel changes in these Alchemic words are the same as evidenced by Blau (1979: 222-232). What I can perhaps offer as further detail is the probable use of Coptic orthographic practices, i.e. word-final /a/ marking with <e>, i.e. phonetically schwa, and the use of /o/ instead of /u/ in stressed syllables. In relation to the phonological analysis of nonstandard Greek vowel usage in this book, the value lies in repeating some of the same phenomena between the phonetic level and that of orthography. Voiced and voiceless stops are replaced here as they are between the Greek language and an Egyptian writer; even though Late Coptic probably had voiced plosives, they

are here marked as they were in early Greek loanwords in Coptic with their voiceless counterparts. I am taking this as evidence that the interchanged usage of the plosives regarding Greek was because Coptic did not have a corresponding match in its phonemes, as it clearly did not have with Arabic either. Coptic had, superficially speaking, the graphemes available for voiced counterparts but these were often not used in Greek words, nor in these Arabic loanwords. Perhaps this is related to the fact that strictly speaking, they no longer bore a perfect resemblance to voiced plosives in Greek when the alphabet was taken for Coptic; the stops were in Greek on their way toward fricativisation.

Another, perhaps plausible reason is that they were not used because they were seen as alien, whereas loanwords from another language were seen as part of the native language usage, and accordingly treated within the phonological and orthographic usage of one's mother tongue. This discussion started in Section 4.3.2.1, and will continue in Section 5.3. It is also of some interest that even though the near-phonetic outcome of Arabic loanwords such as the ones presented here has previously been seen as a by-product of dictation, Blau (1979: 218) discards this notion as not believable. The situation is not dissimilar to the theoretical framework of this work. As noted in Section 1.4.2.1 in Introduction, also the peculiar phonetically grounded spellings of Narmouthis ostraca have been considered to have a background in dictation. As discussed in Chapter 3, however, the level of language being spoken out loud is not the only reason why so-called phonetic spellings might occur when writing a foreign language; a foreign language is processed through the phonological system of one's native language, unless there is a genuine situation of fluent (often childhood) bilingualism. Blau concurs that he believes the text at his disposal was copied, as might equally likely be the case with Narmouthis ostraca, given the likelihood of educational purpose behind at least some of the texts.

Coptic had graphemes for voiced plosives, but these were traditionally only used in Greek words. Perhaps this was why the graphemes for voiceless stops were used, in order to stay within the phonemic realm of "Coptic proper". Another reason is of course even simpler: at the time of writing these texts, e.g. π <p> was phonetically /b/, so why would anything else have been used? In any case it can be seen that this was a feature deriving from the phonological system of Coptic, and the presence of it in nonstandard Greek was equally due to impact from (Coptic-)Egyptian.

5.3 Greek texts from other Egyptian areas

The phenomenon described and analysed in Chapter 4 regarding the nonstandard orthographic variants of Narmouthis ostraca is repeated also in other parts of Egypt in the Roman period. The misspellings based on the phonological level, be that Greek or Egyptian, were not an issue in e.g. Vierros's study of the notaries from Pathyris; on the other hand, the notaries probably underwent a decent education to the profession. However, the time period concerning Vierros's study was a few centuries earlier (from the first two centuries BCE; Vierros 2012: 21), and therefore two things had not occurred: Greek phonological raising had not begun in the intensity it was gaining during the Roman period, and the Coptic stage of the Egyptian language had not emerged. Variation existed also prior to the Roman period but it was mainly morphosyntactic in nature with only minor phonological confusion mostly related to *iotacism* that had its root deep in the Attic dialect usage turned to Koine Greek. Vierros (2012: 107-117) shows nonstandard forms with minor phonological confusion mostly related to monophthongisation, confusion of voiced and voiceless stops, the loss of vowel quantity, and possibly to the change of the stress system.

However, during the Roman period, underdifferentiation of Greek phonemes, allophonic distribution of /o/ and /u/ according to Coptic prosodic rules, and coarticulatory effects within the usage of /i/ and /e/ are all broadly present in Greek usage in Egypt. Dahlgren (2016b) gives a preliminary analysis of the main features of Greek usage in Egypt, in which the variation in Greek vowels has been compared to that in Greek loanwords in Coptic as well as Arabic loanwords in Coptic, and a hypothesis of an independent language variety has been suggested.

The information gathered and given by Gignac (1976) has been used extensively in support of the analysis provided in Chapter 4, therefore details of Gignac's research will not be shown in the same amount in this section. Rather, I have here wanted to look at the overall linguistic situation, taking advantage of the huge amounts of texts in digital form, a benefit Gignac did not have in his day. I have used three search engines as an aid to the analysis conducted here. The Papyrological Navigator[74] has been used to test whether the spelling variants for the words presented in Chapter 4 were more broadly spread, and for phonemic searches, I have used The Trisgemistos Text Irregularities Database (description of principles of use in Depauw & Stolk 2015) and a preliminary version of another phonemic search engine, Paratypa (description of the principles used in developing of this and how it differs from Trisgemistos Text Irregularities Database will follow in Henriksson, Dahlgren & Vierros in prep.).

To allow for a convenient comparison between the book chapters, the examples are here presented in the same order as in Chapter 4 analysis of OGN I Greek, and Section 5.1 analysis of Greek loanwords in Coptic. Because of the vast quantities of the material and the nature of the Greek language structure, allowing for syncretism between for example morphological case, mood or tense marking and strictly phonological phenomena such as vowel raising, it has not been possible within the limits of this study and technological resources currently in hand to go into detail about all the attestations. Therefore, this will necessarily mean that numbers for a given phenomenon are subject to misreading especially in cases where variation can be either morphological or phonological, as in (seemingly) nonstandard Greek case usage. However, the amount of attestations in itself should give an inkling as to the extensiveness of the phenomenon at hand, and as pointed out in Section 4.3.2.4, in many cases the distinction between a grammatical error and e.g. contact-induced allophonic variation is difficult to make, and equally often these go together.

[74] The Papyrological Navigator, an open-access Internet platform, currently holds ca. 70 000 Greek texts.

Because of the uncertainty this type of research will leave, I have selected a few specific corpora for a more detailed phonemic analysis comparable to those in Chapters 4 and previous sections of 5. The main purpose of this section is to give a general idea of the particular type of variation that was an integral and also apparently a far-spread feature of the Greek spoken in Egypt, especially on the phonological level. A more detailed study of Egyptian Greek as an independent language variety is in preparation and will follow after this study.

5.3.1 Evidence for reduction of unstressed vowels in Egyptian Greek: /a, e, o/

There are no other attestations of the specific verb form *kerasen* from the standard *kerason* within the Greek texts provided by the Papyrological Navigator (PN) but there is what appears to be phonetic-based confusion regarding τελεσεν <telesen> also discussed in Section 4.3.1. In *P.Mich.* 5 228 the editor of the text has corrected ἐπετελεσον <epeteleson> in the text to ἐπετέλεσεν <epetelesen>[75], a 3rd person singular active aorist indicative from ἐπιτελέω <epiteleō> 'complete, finish, accomplish'. The text is from Arsinoites, Fayyum, a petition to a strategos, from the year 47 CE. It is therefore from the same area as the Narmouthis ostraca, and within the same time period as them; OGN I 72-73 with the nonstandard form *telesen* from the standard *teleson* have been dated to 2nd-3rd centuries.

From the context it is clear that a 3rd person singular is intended as the text is a petition to bring a violent man to justice, and in the section where the verb occurs the letter sender (Θουῶνις <Thouōnis>) is listing all the horrible things the man accused of the crimes did (insulted him and his pregnant wife as well as hitting the wife so that she in the end gave birth to a dead child and became very ill herself). The linguistic standard of the letter is otherwise not bad with only minor phonetic spellings between /ei/ and /i/, and /y/ and /oi/, respectively, but from confusion of cases and an infinitive form that could not possibly be based on any phonological level (e.g. nonstandard πληρους <plērous> (adj.gen.sg.fem/masc) vs. standard πλήρεις <plēreis> (adj.acc.pl.fem) from πλήρης <plērēs> 'full of', with the subject in singular) it is clear that the writer of the letter, whoever that was, was not native Greek. It is clear enough that this regards a genuine confusion on the phonetic level, and is an interesting counterpart to the variation discussed in Section 4.3.1 with the same nonstandard graphemes now used in a reverse manner. It could be of interest that there is also a nonstandard form προσβυτεροις <prosbyterois> instead of the standard πρεσβυτέροις <presbyterois> 'elders', the change of vowel occurring in the unstressed syllable, probably again depicting schwa phonetically; also, as in Section 4.3.1, proof that the phenomenon is not restricted to verbs. The same form *epetelesen* is found in another Arsinoite petition to strategos, from the year 48 CE (*P.Mich.* 5 230). It is of course possible that there is simply a confusion of the form and *teleson* is in fact meant by the writer, no matter how ungrammatical, but all of the nonstandard attestations between /o/ and /e/ presented in this book put together it seems more likely that the confusion is phonetic.

The language use described above was more than likely that of an Egyptian scribe who was fairly competent in Greek but faltered in some of the morphological subtleties of Greek. However, there is also evidence of the same word-final vowel being reduced in the letters of a non-Egyptian writer, Gemellus from Fayyum, whose language use was first mentioned in Section 4.3.2.1. His letters from the corpus *P.Fay.* have been analysed linguistically by Leiwo (forthc.). Leiwo has come to the conclusion that Gemellus's (linguistic) background might not be known, it might even have been Latin judging by the name. Leiwo notes that this type of assimilation is typical for Latin but carries on that Gemellus has other linguistic features typical of "military language", for example the use of imperatival future indicative with a politeness formula instead of the aorist participle required, a grammatical feature Gemellus's son Sabinus had already learned with better schooling.

Whatever Gemellus's first language was, it was clearly not Egyptian. Gemellus has misspellings concerning the same phonemes as the writer of *P.Mich.* 5 228 i.e. /ei/ with /i/, and /y/ interchanged (consistently) with /oi/, typical also for native Greek writers of the time.

[75] PN search run on 2nd August 2016, and checked on 23rd September 2016.

However, even though there are not many misspellings regarding /o, u/ or /i, e/ confusion or none at all of /y, u/ as there were in Narmouthis ostraca, there is variation between /o/ and /e/ as in the previous examples, and always in a word-final unstressed position. Again there is variation within verb inflection and that of nouns alike. An interesting point in reference to the section with Greek loanwords in Coptic is the usage of <o> instead of <e> for the marking of the unstressed vowel: as mentioned above in Section 4.3.1 and again in Section 5.1., this seems to have been the habit in Fayyumic Coptic at least to some extent. The letters by Gemellus have been written in the year 100 CE so having orthographic similarities, furthermore within the same region as Narmouthis, is not very surprising. It is possible that professional writers from a temple milieu with an Egyptian background managed to spread some of the nonstandard orthographic habits stemming from the impact of their native language to the general populace, at least locally. Generally speaking, as noted by Leiwo (forthc.), Gemellus has a very idiosyncratic way of writing even if it was clear he had learned some idioms by heart and was generally fluent in Greek. He has some quite fixed habits, for instance /e/ is very often confused with /o/ word-finally but hardly ever the other way around. Gemellus also regularly confuses the noun ending -*as* with -*es*, probably because of the plural ending levelling that resulted in only the latter form existing in Modern Greek, but phonology probably played a part in the confusion as discussed in Section 4.3.2.1 in relation to the phonemic/graphemic confusion with personal pronouns. All things considered it seems that the confusion word-finally of /a, e, o/ is indicative of these phonemes being realised to [ə].

A further striking point to Gemellus's language use is that he almost always uses the same graphemic forms of the words that have nonstandard orthography, no matter how nonstandard, from letter to letter. It is clear that he sees them as some sort of standard, even if he (probably) himself decided which graphemic variants to use for originally different phonemes that had merged. This is especially noticeable with the confusion between /y/ and /oi/: very often the standard <oi> has been replaced with <y> and also vice versa, although according to Leiwo less frequently. This applies even to such frequently used words as οιειωι <oieiōi> for υἱῶι <ʰyiōi> 'son (dat.)' and πυησας <pyēsas> for ποιήσας <poiēsas>, a masculine singular active aorist participle for 'make, do'. As a "scribal" phenomenon this is the almost opposite of the scribe in *Codex Schøyen* analysed in Section 5.1.6 seemingly longing for variation, and might be indicative of language attitudes in between the cultures, where the Greeks and Romans were more keen to follow a standard, even if it meant creating one yourself.

Below are some examples from the letters of Gemellus: a minor example of /i, e/ in (21a) which is likely to be a phonetically-based error as otherwise there would be a change in meaning regarding the conjuction ('if' versus 'or'), proving some kind of uncertainty regarding the quality of *eta.* Mainly there is variation of word-final /o, e/ as in (21b, 21c, 21d) with some confusion word-finally between /a/ and /e/ (21e).

Nonstandard	**Standard**	
(21 a) η <ē> 'or'	ἒι <ei> 'if'	*P.Fay.* 114: 19
(21 b) εχομον <ekʰomon>	ἔχομεν <ekʰomen>	*P.Fay.* 118: 14
(21 c) μελλομον <mellomon>	μέλλομεν <mellomen>	*P.Fay.* 115: 6
(21 d) εχοντος <ekʰontos>	ἔχοντας <ekʰontas>	*P.Fay.* 118: 18
(21 e) παντες <pantes>	πάντας <pantas>	*P.Fay.* 115: 9

Related to the military milieu of *P.Fay.*, one final corpus has to be taken to the front regarding the variation between /a, e, o/. The nonstandard language usage described above is also reminiscent of the language use encountered in the *O.Claud*. corpus, also analysed by Leiwo (2005, 2010 and forthc.). There seems to be confusion in the verb inflection by one

Petenephotes between infinitive and imperative forms but according to Leiwo (2010: 114-118: 2005: 251-253), the confusion rests largely on the phonetic level due to the verb endings' similar phonetic character, the impulsive-looking word-final <e(n)>/<e>/<ai>/<on> alternation having one thing in common, i.e. the phonetic form [ə]. This was due to the Egyptian-influenced reduction of the word-final unstressed vowel (the variation in its full spectrum regarding the multicausal nature of it is analysed in Dahlgren and Leiwo in prep.). Again, there is no confusion between /y/ and /u/ in this corpus, nor any particular confusion of e.g. /i/ and /e/ as there is aplenty in the Narmouthis ostraca. The writer whose linguistic habits are under discussion here was Egyptian but his writing habits were largely (or even exclusively) connected to the military garrison nearby where he apparently delivered provisions in the middle of the 2nd century CE (Leiwo 2005: 248). The time period is within the range of the texts in OGN I, the 2nd century CE, but the geographical location is different, the Eastern desert of Egypt. Therefore it seems that there was a language variety in general use with features stemming from the impact with (Coptic-)Egyptian, spread to the broader public through the military surroundings and scribes, although scribal influence probably consisted of more local idiosyncratic varieties.

Gitōnos from the standard *geitones*, as seen in Section 4.3.1, has also other attestations but while it belongs in the group of /a, e, o/ it will nevertheless again be analysed in the next section in connection to the /y, u/ variation. The reason for this is that the nonstandard usage of it seems to be tied to the theory introduced in in Section 4.3.2.1, related to the first generation bilingualism in Fayyum.

The attestations of /a, e, o/ confusion above are all from early Roman period but the phonemic search between e.g. /o, e/ and /a, e/ give examples of this confusion from all periods ranging from the 3rd c. BCE to 8th c. CE throughout Egypt. TM gives 1460 for <e> instead of <a> and 553 for <a> instead of <e>; in Paratypa, these numbers are 1724 and 647, respectively. For <e> instead of <o>, TM gives 347 instances and <o> instead of <e> 242 instances; Paratypa gives 506 and 402, respectively. With the phonetic variants represented by e.g. the original long vowel graphemes and the diphthong <ai> for /e/, the numbers grow vastly larger. It is not possible to go into context for this analysis to determine how much of the variation is phonological, but I expect a fair bit of it to be at least a combination of phonological and morphological, as previously discussed. Proper statistical analysis will have to wait until a later time.

5.3.2 Stress-related confusion of /o, u (y)/

Evidence of the frequent confusion of /o/ and /u/ discussed in Section 4.3.2.4 is found in Greek papyri more broadly, especially in the unstressed syllable as mentioned before in relation to the Coptic allophonic practice regarding this phoneme distribution. When searched with the phoneme-based search engines, TM gives 360 attestations for <o> being replaced with <ou> and Paratypa 326, and the other way around, TM has 489 instances of <ou> being replaced with <o> and Paratypa 577. The numbers are substantial, although naturally many of the examples concern the Greek article confusion regarding the dative/genitive merger, the matter that has been discussed before in Section 4.3.2.4. However, there are clear examples of stress-related confusion in common nouns as well, as shown below in (22) *lougou*, a possible case of transfer of Coptic stress onto Greek. In (23) *komiontai* there is a nonstandard /o/ in the place of the original Greek stressed vowel, /u/. The Greek original /u/ is on the penultima, a suitable position in Coptic for a stressed vowel; perhaps because the vowel was stressed, it was marked with the rounded vowel variant <o> /o/ that in Coptic marks the stressed vowel. Therefore there is no transfer of stress here, but there is at least transfer of Coptic phonological features and/or orthographic conventions as regards the marking of a stressed vowel.

(22) Nonstandard	**Standard**	
λουγου <lougou>	λόγου <logou> 'word (gen.)' (Oxyrhynchites 390 CE)	*PSI* 8 884.2

(23) Nonstandard	**Standard**	
κομιονται <komiontai>	κομιοῦνται <komiountai> 'to take care of' (Alexandria 30 BCE-14 CE)	*BGU* 4 1123.6

5.3.2.1 Underdifferentiation of /y, u/ and phonemic quality of <y>

The nonstandard form *pourou* has also other attestations apart from those in OGN I albeit only in two other texts. These are also from Arsinoites: *P.Berl.Leihg*. 1.12 is from Euhemereia in Arsinoites (210 CE), an otherwise good quality text with very few spelling mistakes, also including many attestations of what is the correct standard of this word, *pyrou*. *P.Kron.* 44 is a tax receipt from Tebtynis, Arsinoite (148-149 CE) also with only one other nonstandard form besides *pourou* and a couple of forms of the standard *pyrou*.[76] These texts are roughly from the same time period as the Narmouthis ostraca. It is not many, and in comparison the other nonstandard way of producing *pyrou*, written as ποιροῦ <poirou>, occurs in many more other texts: the PN gives 15 other instances besides those present in the Narmouthis texts, and these are also mostly from Fayyum from the first three centuries CE; none are from Upper Egypt. It is also not many, but more than for *pourou*, and gives indication in addition to e.g. Gemellus's writing habits that the quality of *ypsilon* was /y/, as it is so often confused in writing with οι <oi> but not with other (mid) vowels. Judging by the low amount of results on nonstandard representatives of *pyrou,* however, it seems that especially the form *pourou* was an in-group variant almost exclusive to the Narmouthis scribes.

To give a comparison to the usage of Greek /y/, πύλη < pylē > 'gate' (related mostly to tax collection at gates of cities, so the nature is documentary i.e. within the same genre), unlike *pyrou*, is never written with ου <ou> - even the one document in Coptic (*CPR* 4 198) that has a morphological integration of this Greek word into Coptic in it, including a Coptic genitive marker and a feminine article, has written it with <y>. *Pylē* gains 626 hits altogether occurring in documents from Arsinoites (Fayyum) to Elephantine in Upper Egypt, mostly again from the first two centuries CE with some texts from 5th to 7th centuries. The standard form πυροῦ <pyrou>, on the other hand, has 4608 hits, although a fair amount of these are in parentheses i.e. abbreviations expanded by the editors.[77] Still, it is probably safe to say that for the ordinary scribe, *pyrou* was the more often occurring word of these two, and consequently was touched by more L1 variation in the hands of the less experienced or educated scribes. Even though *pylē* also has the foreign phoneme /y/, it must have been learned at heart and therefore repeated in the normative form. Running these two words in standard form together, only 45 texts emerge. These are otherwise not void of nonstandard variation: in *BGU* 3 765, a sales document for exportation of olive-oil, dates and fleece of wool, contains the word *pylē* in standard orthography but nevertheless has /y, u/ variation in ἡμισους <ʰēmisous>, from the standard ἥμισυ <ʰēmisy> 'half'. All but two of the 45 documents are from Arsinoites, from the first two centuries CE.[78] If a document contained /y, u/ variation in one word but nevertheless had the correct orthography in *pylē*, it must be indicative of certain forms having been learnt by heart, some according to standard orthography, some not but equally established as 'standard'.

These examples go toward confirming that there are mostly early attestations of /y, u/ variation with most of them from the Fayyum region. This can actually also be seen within the results of the phonemic search: 121 with instances of /y/ to /u/ replacements can be found with TM, and 208 with Paratypa, ranging from the 2nd century BCE to 8th century CE, mostly

[76] Search run in the Papyrological Navigator 9th May 2015 and checked 24th September 2016.
[77] Search run in the PN 14th July 2015 with the result of 624 for *pylē* and 4592 for *pyrou*. Cheched again on 25th September 2016 with the results as presented.
[78] PN 14th July 2015, checked 25th September 2016. One of the two is from Thebes (*SB* 1 1675) in which *pyrou* is an editorial addition and the other one's origin is 'unbekannt' (*P.Customs*. 486); both words are editorial additions. These ones are therefore not useable examples for phonological analysis, even though it is clear that both additions are correct.

designated to Arsinoites but quite a few also from Memphis, Pathyris and Thebes, Antinoopolis, Aleksandia and even Abu Mena (the western coast). The phenomenon, therefore, is geographically quite well represented. It seems to be limited mostly to the earlier periods, however, as predicted in Section 4.3.2.1., as the later ones are mostly various graphemic variants of *hēmisy* which seems to be treated along the same lines as *pourou* and *gitōnos*, as some sort of an administrative new standard; this seems to have started early, in the late 2nd to 1st century BCE. There are many nonstandard variants that are connected to diphthongal use, an element perhaps related to the use of Coptic alphabet by the writers.

It is interesting to see that certain administrative terms related to land sales and taxes seem to have gained (mostly) local standards in the superficially chaotic orthographic variation including e.g. creative interchanged usage of the various graphemes that formerly had quantity distinctions. These were deviant from standard Greek but some scribes in the area followed or were taught these nevertheless, maybe even had exemplary models of them with the help of which to write documents. *Gitōnos* from the standard *geitones*, familiar from sections 4.3.1 and 4.3.2.1 is one of these curious new standards that shows up in the same graphemic form in a number of documents from Arsinoites as a nonstandard form for the plural *geitones*; 15 in addition to that in OGN I written as above with *omega*, and ca. 40 more written with two *omicron* γιτονος <gitonos>, all from the first two centuries CE and practically all from Arsinoites.[79] Many of these documents, such as *P.Vind.Tand.* 25[80], even have the same nonstandard form repeated two or three times, and other phonological variation that looks Egyptian-influenced in the form of e.g. /o, u/ confusion as well – clearly, for these scribes, this was the standard for the word.

This raises a question as to what triggered the nonstandard usage; at which point was a word considered as part of the native language vocabulary, receiving phonetic spellings, and at which time was it completely phonologically integrated into the native language with no or very little variation remaining? There seems to be a correlation between the frequency of usage and orthographic variation, but it is not a symmetrical continuum. The degree along which this seems to be realised is presented below.

Phonological Detail: Degree of loanword phonological integration

As can be seen from the apparent use of the locally coined standards *pourou* and *gitōnos* and the comparison of these to for example *pylē,* there seems to be some sort of a correspondence between the frequency of a word used and the regularity of its orthographic form. *Pourou* and *gitōnos* are words this particular group of writers used frequently in their work, whereas *pylē* was a word probably mostly encountered in literature or at any rate far less frequently than the other two. The /y/ in *pylē* is always written according to the original standard. This has lead me to form a degree according to which this loanword orthographic integration and nativisation of loanwords seems to develop, having familiarised myself with various other words that turn from nonstandard semi-official variants to new "standards" easily. In addition, there are other words that have almost a senseless amount of variation. The degree is described in Table 17.

[79] Search run in the PN 14th July 2015 and checked 25th September 2016.
[80] The other papyri are *CPR* 1 198, *P.Mich.* 5 251, *P.Mich.* 5 258, *P.Mich.* 5 259, *P.Mich.* 5 263, *P.Mich.* 5 298, and *P.Mich.* 5 327.

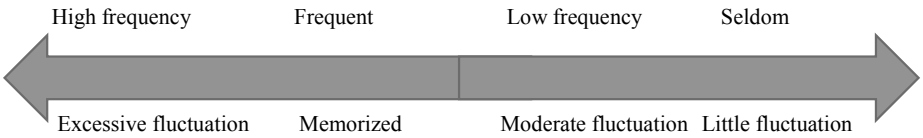


Table 17. Degree of loanword phonological integration before stabilisation.

The *high frequency* loans will be the most subject to variation because they are considered a part of the L1 lexicon and therefore a writer will not bother checking the spelling. They are treated as 'own', i.e. the handling of them will be seen free of responsibility toward the donor language. One such example is *holokottinos* with its almost impossible amount of variation (see Section 4.3.2.1 for analysis).

The *frequently* used loanwords will still be considered loanwords i.e. not part of the L1 lexicon, so consciousness of the donor language's orthography will remain. They will appear so often that their standard form will be memorized by most writers. But especially at the early period when the loanword is introduced, there will be fluctuation of the writing form, sometimes continued by writers with less experience and practice even in the later periods. *Pourou* and *gitōnos* seem to belong to this category; there is variation first and mainly in areas with bilingualism i.e. with writers who know the pronunciation of Greek: later the orthographic form becomes stabilised. Coptic use of *psykʰē* also belongs to this category: it is hardly ever written in a nonstandard way, which is why I used it as a test word to evaluate the level of the writer's Greek skills in texts. It was written nonstandardly only in texts with excessive amount of variation.

Low frequency loanwords will be subject to moderate fluctuation because of the high consciousness of them being a part of L2 lexicon, combined with fewer instances of dealing with them. Nevertheless, these will be used often enough for some reminiscence of their form to have been learned by heart, and will therefore be subject to false memories of their orthographical form, combined with the familiarity of them to trigger integration into L1 phonological system. The nonstandard usage of Greek word-final schwa discussed in Section 4.3.1, especially related to verbs, belong to this category: *kerasen, telesen, pempˢe(n).*

Seldom used loanwords will most likely have little or no integration into L1 phonological system because they are rarely used. They will most likely be checked according to correct spelling because of total uncertainty as to the standard form. These are encountered in Greek loanwords in Coptic, for example *hormiskos,* which is hardly ever misspelled.

A modern parallel can be drawn from e.g. the L2 English usage within Finnish. English has no official status in Finland and its usage is relatively new and prestige-bound, mostly related to the status of English in popular culture and more generally, the *lingua franca* of today's world. Mostly, Finnish loanwords come from Swedish, Russian and German, but there are some English ones as well. Older, proper loanwords have been totally integrated into Finnish phonology and accordingly, received a conventional orthographic form to that effect. Therefore, for example *pihvi* 'steak' from English *beef* has replaced the foreign phone /f/ with a better matching /hv/ sequence, replaced /b/ with /p/, and a word-final vowel has been added to adjust the word to Finnish

phonotactic rules because Finnish nouns in singular usually end in a vowel. Furthermore, loanwords that end in a consonant are usually modified with a word-final /i/ in their Finnish form.

That described above is the system in which most loanwords from any languages have been integrated into Finnish, and *pihvi* makes no exception. But, there are a number of English words used in everyday Finnish that are not yet fully integrated phonologically as loanwords but are still seen as foreign words, no matter how frequently they are used. One of these is *cool*, and others are *guuglata* 'to google', and, for instance, *boikotti* 'boycott'.

The last one of these, *boikotti*, 'boycott' is so much a part of the Finnish lexicon that it would not be surprising to see it in a newspaper, and indeed it is, occasionally. It has, as can be seen, also been adjusted to suit Finnish phonology and phonotactic rules. It is, however, still clearly a foreign word, whereas most people do not even think of *pihvi* to be anything other than Finnish. *guuglata* 'to google', on the other hand, is frequently used as a term related to doing Internet searches. It is not part of standard lexicon but has been partially integrated to language so that there is flexibility to its writing form. Some still write *googlata*, partially faithfully to the English original, only adding Finnish verb ending, and more and more people are writing *guuglata*, after the phonetic form, as is usual to loanword usage. *Cool*, however, has retained its original writing form and is hardly ever written *kuul*, which would be the Finnish integrated way, even though phonologically, it has been adapted to Finnish, being pronounced with a non-aspirated /k/ and a retracted /u/ [ku:l].[81]

In my opinion, the regularity of these three words and others of similar kind follows the degree presented in Table 17 above. *guuglata* is probably much more frequently used than *cool*, as the first is an increasingly common term for Internet searching, and used by people of various ages and social groups – it is neutral in nature, whereas *cool* is still seen as something used for effect, and is more likely to be used by young people than adults, and is still directly related to the fashionable status of English in popular culture. It is clearly a foreign word, but frequent enough that it receives Finnish inflection: as an adjective, it is inflected in Finnish as (24) *coolimpi* 'more cool' and not (25) *enemmän cool*, 'more cool', *verbatim*; however, in the comparative form, the word does receive a Finnish binding vowel (BV) /i/ before the actual comparative ending, quite similarly to the word-final added vowel in *pihvi*.[82] Similar spellings, which retain the source language orthography, were also found in British texts even into the 20th century, for example 'rôle' for *role*, 'oeconomics' for *economics*, and the

[81] Google search on 19th August 2015, restricted to Finnish language web pages. I searched for 'guuglata' and 'googlata' – the first got 10 900 hits, mainly consisting of twitter and Facebook updates and chat room conversations, and second 140 000 hits, which included chat rooms, a large number of (semi)official sites such as web dictionaries, webpages for e.g. health information (www.terveys.fi), and even the national news service website (www.yle.fi). The search for 'cool' vs. 'kuul' proved more problematic because *cool* has become such a widely used effect word in Finland that the word in standard orthography exists in many business names. I therefore searched for the comparative form in both writing forms, which lead to a number of chat forums with real language use. The result in these was clear: 'kuul' was only found in one chain of conversation, while there were countless with 'cool'. Internet searches are probably not, in general, a completely reliable method for research but in this case, the results were clear enough to be used to give an idea of the tendencies with which these words are used in Finnish.

[82] *Iso Suomen Kielioppi* (*The Big Grammar of Finnish*) gives instructions to inflect loan nouns as Finnish ones (VISK §151). *Cool* is mentioned in the examples. Accessed 19th September 2016.

still frequent fluctuation in words such as *archaeology/archeology* and *aesthetic/esthetic*.[83]

(24) cool-i-mpi
cool-BV-COMP(SG)
'more cool'

(25) enemmän cool
more cool
'more cool'

This is not to say that in the future it might not become completely or at least more integrated to Finnish phonology similarly to what seems to be happening with *guuglata* 'to google', or has happened with e.g. *pihvi*.

Therefore, it seems that the degree of frequency to orthographic standard as proposed in Table 17 applies: the highly frequent foreign word fluctuates in orthography, as it is no longer completely seen as a foreign word. It has been "owned" and is becoming integrated into L1 phonology and orthographic standards. The frequent word is still seen as foreign, but is so often used that the standard orthographic form is remembered by heart.

This brings me back to where I started, the effect of language contact. The situation in Egypt with Greek could perhaps be compared to Indian English; native language phonological structures are used when speaking the second language, significantly changing the phonetic outcome of it compared to the native language level. Variation was innovative, typical of first generation bilinguals as proposed in Section 4.3.2.1. Native language phoneme substation was frequent and salient, and seems to have left traces of it to the later periods.

For instance, speakers of Indian English typically have a syllable-timed rhythm, when standard English one is stress-timed, and produce full vowels in reduced syllables and generally in unstressed positions, which further complicates the ability to perceive stress. This makes for an unusual rhythm in the spoken language because ultimately, wrong syllables are stressed. Unreduced vowels in English similarly sound curious to a native speaker, making it difficult to hear where stress lies. Phonemically, one of the most noticeable features are the transferred retroflex stops that standard British English does not have. (Deterding 201 0: 392-395).

Syllable-timing in Indian English has roots in language contact, i.e. it is derived from the phonological structure of the Indian native languages which have this stress system. This is exactly as it was in Roman Egypt: the nonstandard stress patterns in Greek were probably also caused by the impact of the native language, Egyptian.

[83] I thank Brian Joseph for these insightful examples. The fluctuation between -ae-/-e- in e.g. *archaeology/archeology* is mostly a British/American English distinction (Oxford English Dictionary Online, accessed 29th April 2017).

5.3.3 Coarticulatory adaptation of /i, e/ in the process of front vowel raising and the quality of *eta*

It is probably not surprising that /i, e/ variation in its many graphemic variants forms the biggest nonstandard attestation group when tested in the phonemic search engines. Numbers are high, /i/ instead of /ei/ alone gives 17 322 attestations in TM and 19 099 for Paratypa. Variation between *eta* and *epsilon* naturally gives fewer results, 1040 original *eta* for *epsilon* in Paratypa and 833 in TM. This is undoubtedly a phenomenon found everywhere in Egypt at all times because of the simultaneous raising of Greek vowels and the effect of bivalent *eta* in Coptic. I have therefore selected one papyrus that displays the variation in a particularly clear coarticulatory setting, the *P.Stras. inv.* 1023 currently under publication by Benoît Laudenbach.[84]

Laudenbach has estimated the papyrus to date to 5th century based on the contents and formal characteristics; writing is typical of the style of Byzantine period but not especially professional in production, for example in the unsystematic use of cursive with some uncial letters, and various methods of abbreviating. It is a Christian setting private letter from a son to his mother via a third person, typical of Christian Greek epistolography. It also mentions St John's martyrium in Alexandria, from where the letter has been sent, although no specific provenance for where the letter was written is known; through the nonstandard linguistic features, an educated guess toward Arsinoite is made. (Laudenbach to appear).

Related to the dating, there is a rather surprising use of the term *holokottinos* in the letter; as mentioned in Section 4.3, this was a term used by the Egyptians, whereas the Greeks used the form *noummos* for the same gold coin. The term is very rare within Greek texts: PN gives only three attestations for it that are not in Coptic or Greek-Coptic bilingual texts: *P.Oslo* 3 162, *P.Oxy* 9 1223, *PSI* 7 783 and *SB* 1 2022[85], the three first ones from the 4th and the last one unknown: in other words, a bit before *P.Stras. inv.* 1023 edited by Laudenbach. The use of this term is in my opinion a sure sign of the writer's Egyptian background, and the nonstandard forms of Greek seem to confirm this belief. The rare usage of it in Greek texts limited to the 4th-5th centuries CE might also be related to the emergence of the Coptic writing system; in the early period of Coptic proper, there might have been more confusion between Coptic and Greek conventions on the level of writing.

There is variation between /l/ and /r/ which points toward Fayyumic Coptic background. But more than that, the variation in *iotacism* displays the same phonetic phenomena as was analysed in relation to the Narmouthis ostraca in Section 4.3.3. There are 22 nonstandardly written words altogether in the text, and out of these 14 that display variation indicating consonantal coarticulation, sometimes stress-related. These occur in the same phonetic environments as analysed in reference to the OGN I ostraca in Section 4.3.3. In fact, the similarity is almost remarkable. When there is retraction in vowel quality, the variation always occurs adjacent to bilabials, liquids, /s/, and nasals. Vowel quality in nearby syllables affects the quality of liquids and nasals, exactly as described in Section 4.3.2.4.

Bilabials retract the close vowel quality (from /ei/ [i] to /e/ [ę]) in e.g. μηζονα <mēzona> for the standard μείζονα <meizona> for 'big' (adj.comp.sg.masc./fem.acc.); there is retraction near liquids in τρηαδος <trēados> for τρίαδος <triados> 'three; triad' (noun.sg.gen.fem.) and in τεληας <telēas> for τελείας <teleias> 'perfect' (adj.sg.fem.gen./pl.acc.) connected with back phonemes in the adjacent syllable(s); and there is fronting adjacent to /s/ connected with front phonemes as in εποιεισα <epoieisa> for εποίησα <epoiēsa> 'make, do' (sg1.aor.ind.act.).

---

[84] I wish to give the warmest thanks to Benoît Laudenbach for giving me access to his unpublished material for my phonetic analysis.

[85] PN search run on 17th August 2016 and checked on 4th October 2016.

Similarly to what was found in Section 4.3.3.3, it does not appear that *eta* had raised to /i/ yet as it is in variation with *epsilon* although there is only one example of this: θεβαειδη <tʰebaeidē> for θη- <tʰē->, again near a bilabial. However, this is noteworthy: there is no variation with *eta* and ι <i>.

Table 18 shows the consonantal coarticulation of these attestations.

Nonstandard	**Standard**	**Coarticulation**
μηζονα <mēzona>	μείζονα <meizona>	/i/ → /ę/ /m_ (bilabial)
τρηαδος <trēados>	τρίαδος <triados>	/i/ → /ę/ /r_ (liquid + /a/)
τεληας <telēas>	τελείας <teleias>	/i/ → /ę/ /l (liquid + /a/)
εποιεισα <epoieisa>	εποίησα <epoiēsa>	/ę/ → /i/ /_s (/i/ + bilabial + /s/)

Table 18. Effect of coarticulation on Greek front vowels.

Coptic background seems like a justified estimation for this letter writer judging by the language use as well as using the term *holokottinos*. It is a perfect example of all the /i, e/ variation in one letter to compare with that in the OGN I texts. The dating is later but the provenance probably the same – however, /i, e/ variation is plentiful in every area of Egypt where someone wrote anything, and it is frequently connected not only to Greek vowel raising but also the consonantal environment. A study of how /r/ affects Greek vowels is underway in Henriksson, Dahlgren and Vierros (in prep.), taking advantage of the digital possibilities for studying phonemic variation in a phonetic context.

Conclusions for Chapter 5

In this chapter I showed parallel evidence to the phonological variation in Narmouthis ostraca from Greek loanwords in Coptic, Arabic loanwords in Coptic, and finally other Greek texts from Egypt. The same linguistic phenomenon is present in all of the examples: coarticulation of consonants on vowels, phoneme replacement according to L1 phoneme distribution, and reduction of word-final vowels; even, as it seems, transfer of stress.

The numerous misspellings in Greek are probably mainly the result of the scribes not remembering the Greek orthographic standard and trying to write the language as it sounded. The phonetic form on which the graphemic representation lay might have derived from the contemporary pronunciation of Greek or the impact of Egyptian phonology on Greek, and in fact, quite often both. In the end, however, there is little relevance as to which one was at effect – the close attention to making coarticulation visible on the graphemic level was a phenomenon related to Coptic, which can also be seen in the renderings of Arabic loanwords in Coptic. It is a feature related to the linguistic structure of Afroasiatic and other consonant-rich languages, in the interest of emphasising the quality of the consonants on which the main responsibility of word formation in those languages rests.

In Arabic and pre-Coptic Egyptian varieties this feature of the language is unattested because there were no vowel graphemes to show such coarticulatory variation. Coptic, however, had the Greek alphabet at its disposal and partly because of the novelty of the alphabet, strived on a transparency of the phonetic reality of the language in its orthography, including graphemic representation of coarticulation. This practice has given us information on

Coptic phonemes and stress system as well as those of Greek, in the form of nonstandard spellings. Furthermore, there seems to be enough evidence to classify the language variety spoken in Egypt as an independent form, Egyptian Greek. This, however, needs still more research on a much larger scale.

6. Discussion

In this work I have studied Greek nonstandard vowel orthography in the Narmouthis ostraca with the hypothesis that it was caused by Egyptian influence. There was a language contact situation in Egypt for several hundred years even before the Roman period from which the Narmouthis ostraca come; furthermore, Fayyum was probably the most bilingual area in Egypt. There is clear evidence of Egyptian phonological transfer in the nonstandard usage of consonants; for example variation between voiced and voiceless stops has been seen to derive from the impact of the Coptic phonological system, as presented already in Gignac (1976). It therefore seems logical to presume that phonemic variation would occur within vowel usage as well. This has been discussed in e.g. Horrocks (2010) and Gignac (1976 & 1991) to some extent but most of the e.g. front vowel fluctuation has still been considered to largely result from the raising of Greek front vowels to /i/. In what follows I will discuss some of the most important findings of this work and present future research opportunities presented by this work.

Greek loanwords in Coptic and phonetics

Vowels are more difficult to study in terms of variation as the Egyptian stage of the language at the time period of this study, the one also used in the Narmouthis bilingual text collection, Demotic Egyptian, did not use vowel graphemes. Coptic, therefore, seemed like the only comparison for the phonological features found in the Narmouthis collection Greek, all the more so as there are Coptic sources early enough as coming from the 3rd century CE, and a preliminary form of Coptic writing attempted in the Narmouthis Demotic ostraca. I therefore used Greek loanwords in Coptic as parallel material for my phonological analysis as they seemed to contain variation of a similar nature.

I wanted to study the variation as if Greek and Egyptian were living languages, so in Chapter 3 I presented various methods that aid this type of study in which the evidence is in written form only but the level of language under scrutiny is the spoken one. Under the theoretical framework of second language writing system studies, loanword phonology and coarticulatory phonetics I managed to obtain results that in my opinion reveal the reality behind this phonological variation.

Transfer features of Egyptian

Both sources, L2 Greek as well as Greek loanwords in Coptic, displayed variation that could be classified as having three different transfer features, all deriving from the phonological structure of Egyptian: reduction of especially word-final unstressed vowels, stress related allophonic variation, and fluctuation of the front vowel quality being partly caused by the Greek vowel raising process and partly by Egyptian influence. Further analysis showed that the nonstandard qualities of the vowels followed those of the adjacent consonants, a result that was not completely surprising as it is a feature prominent in e.g. Arabic, another Afroasiatic language. To make sure, however, that certain features were Egyptian transfer and not Greek internal development, I studied the same phenomenon in Arabic loanwords in Coptic. It reflected the same principle, transfer from the native language of the presumed writers, i.e. Coptic, on Arabic loanwords, again visible in all the aforementioned phonological/phonetic features. Coptic orthographic practices were used to mark the stressed round vowel with <o> when in Arabic this is <u>; there was fluctuation based on the quality of the adjacent consonants especially in the front vowel section; and word-final vowels were reduced to schwa, again

marked as they were in Coptic (with <e>). All of these phenomena in exactly the same details present in two different languages that did not carry them language-internally does not seem like a coincidence: they had a mutual source, i.e. the Egyptian speaking writer. I could therefore conclude that the orthographic variants so similarly used in both of the foreign languages in Egypt came from the impact of the Egyptian phonological system. The analyses of the comparisons can be seen in Chapters 4 and 5.

One of the more puzzling features of Coptic phonology was the quality of Coptic /r/ which in coarticulation analyses gave varying results. Sometimes it seemed to be fronting the vowel quality and sometimes retracting it. Evidence from modern phonetic studies shows that the quality of /r/ generally fluctuates and is easily assimilated to the quality of the adjacent phonemes. As discussed in Section 4.3.2.4, this could explain the confusing results in Coptic phonological analysis; it seems that /r/ is sensitive to phoneme qualities within a wider range than most other phonemes, and consequently seems to front adjacent vowels when there are other front phonemes in the vicinity of /r/, and to retract vowel quality in co-operation with (other) back phonemes. As the quality and distinction of Egyptian and Coptic liquids remains uncertain, a statistical analysis with a much larger sample focusing on the coarticulatory effect of /r/ and /l/ on Greek vowels might show interesting results and hopefully narrow down the phonetic quality of the (Coptic-)Egyptian liquids. With the aid of this preliminary study, this will be attempted in Henriksson, Dahlgren & Vierros (in prep.) with the body of Greek texts offered by the Papyrological Navigator and the phoneme-based search engines introduced in Section 1.4.1.

Another interesting feature of Coptic phonology left unanswered in this study is the quality of Coptic /h/. It is frequently added to Greek words that begin with a vowel as well as left out of ones that have /h/ i.e. *spiritus asper* in Greek. This has been conducted to the extent of some Greek loanwords having a standard form that is opposite to the pronunciation of it in Greek, for example Greek 'hope' is always rendered as *helpis* in Coptic (instead of *elpis*, which would be the correct phonetic form). The traditional explanation for this has been that the quality of Coptic /h/ was simply so much weakened that it was added in some Greek words as a hypercorrective measure; in fact, in some native Coptic ones as well, at least in Sahidic texts (see e.g. Worrell 1934: 37 on this). No doubt the quality of it was weak, as could be deduced from the function of <h> as an apparent orthographic marker of a long vowel quality in Section 5.1.5 in connection to the possibility of the transfer of the Coptic stress. Nevertheless, this is a phenomenon also encountered in L2 English usage of the French and the Italian and might be connected to the differences in the stress systems. I shall continue studying the quality of Coptic /h/ and especially the nonstandard usage of it in Greek loanwords from this perspective in Dahlgren (in prep. (b)).

Functional load of Egyptian consonants

One of the major findings of this work is that Greek nonstandard vowel variation is not random but governed by its consonantal surroundings. Moreover, it is not merely phonetic, it is also functional: the Egyptian scribes did this because in their native language, word formation principally relied on a consonant root, so clear identification of consonants was essential. This topic was discussed in Sections 2.3 and 4.3.1, and as mentioned then, the phenomenon has also been attested in other consonant-rich languages such as the North-West Caucasian languages and Northern Chinese. As found by Traunmüller (1999) who studied these languages, consonant-to-vowel coarticulation gives information of the consonant's quality through the modified quality of the vowel. For instance Arabic carries an impressive consonant inventory where there is opposition between stops in the uvular, velar and pharyngeal place of articulation,

so to be able to tell these apart it is useful for the preceding vowel to already possess some phonetic qualities of the stop before the stop is even uttered.

The language structure of Egyptian was the same as that in Arabic so early information of the quality of the consonant was important for the listener. The Egyptian speakers of L2 Greek simply treated the second language along the same principles as their native language, emphasising the consonantal quality; this is essentially one of Weinreich's basic principles within language transfer phenomena, transferring a feature of the first language that is linguistically significant for the first language but redundant in the second (Weinreich 1979: 18-19). Coarticulation alters phoneme quality in any language due to the simple anatomic nature of it and it is probable that it did so in the Greek in Roman Egypt as well but for the L1 Greeks, there was no information gained in emphasising the quality of the consonant through the vowel; in fact, this hindered understanding of Greek and caused misunderstandings and confusion because morphological information in Greek is to a great extent placed on vowel qualities. In some cases, the meaning was lost almost completely because reducing the word-final vowel to schwa meant that distinctions between e.g. moods and tenses were lost, a matter that was discussed in Section 4.3.1 and will continue in Dahlgren & Leiwo (in prep.).

Transfer of Egyptian stress?

Transfer of the Egyptian stress system on the Greek used as a second language by the Egyptian scribes is also a relevant finding. On the one hand, while there is probable indication of realignment of stress in Greek words discussed in e.g. Section 4.3.2.3, it cannot be completely clear whether this is indicative of transfer of Egyptian stress or manifestation of a change in the Greek stress system; in other words, did the Egyptian writers simply depict the stress they perceived in Greek words by using the orthographic conventions of their own language? This seems to be what they mostly did with Arabic loanwords in Coptic as evidenced in Section 5.2. On the other hand, Arabic and Coptic stress systems were more likely similar than those of Greek and Egyptian, the first pair coming from the same language family (compare for instance the Germanic language group with the Romance one, where most of the languages share the same stress system, respectively). Therefore there might not have been need to change the stress position in the Arabic words, the same way it probably was not seen necessary in some of the Greek words that matched the Egyptian stress system (see Section 4.3.2.3 for the discussion of this).

Some parallel evidence is available in Greek loanwords in Coptic, however, that seems to indicate the phenomenon in nonstandard Greek usage deriving from transfer from Egyptian. In Section 5.1.6 I go through some unusual nonstandard writing forms of Greek loanwords and present a substantial amount of evidence for what seems to be transfer of L1 stress on Greek. Among the most notable of this is the insertion of <h> as an apparent graphemic marker for a stressed vowel, as well as a geminated consonant performing the same task. Insertion of extra letters to indicate stress when the stress position actually moves cannot be anything else than showing a desire to integrate the loanword to the native language. Stress transfer among loanword usage in the world's languages is not a new phenomenon, so there is no need to doubt this happening in ancient language contact as well. Egyptian and Greek stress systems did not completely match each other in loanword integration or L2 usage: it seems therefore that the results presented in this study about the change of stress position in a Greek word are linked to the treatment of Greek words according to the Egyptian stress rules.

Loanword phonology and societal bilingualism

Although this study has mainly stayed clear of the subject of trying to evaluate bilingualism in Roman Egypt, the subject was touched in relation to the nonstandard usage of certain administrative terms. Especially *pourou* discussed in Section 4.3.2.1 seems to have been a short-lived local variant used by a handful of scribes in the first few centuries CE, after which it stabilised to its standard form *pyrou*. This could be related to the phonemic quality of /y/ and the raising of it to /i/ in the later periods, put there are in fact no variants replacing the first syllable standard <y> with any of the graphemic variants later denoting /i/ while, on the other hand, there was continued nonstandard replacement of Greek <y> /y/ with <ou> /u/ in other words even relatively late, as late as 6th-7th centuries. With all the other near-phonetic misspellings present in OGN I Greek a picture emerges of the so-called first generation bilinguals (in societal terms), of scribes who knew Greek well enough to be able to misspell words according to phonetic approximations of them but who did so with extensive phonological transfer from their native language.

The results of the phonological analyses in these chapters also contribute to the discussion of whether loanword adaptation is phonological or phonetic in nature: as explained in Section 3.3 of the introductory part, researchers in the field are in opposite camps regarding this. Dohlus (2005), however, had compared German and French loanword integration in Japanese and noticed that they have different phenomena: German loans tend to be phonologically grounded, being older and having come to Japanese through written sources, whereas French loans are phonetically grounded, being newer material and therefore having been integrated through an acoustic perception of them. Dohlus's theory is closer to the ancient language contact between Egyptian and Greek than the other theories.

Variation in Greek written by Egyptians has both elements because the written form of it was well known in Egypt, Greek being the official language of the government – in fact in the earlier periods, it is likely that some people capable of writing it did not necessarily know how to pronounce it properly. This seems to have changed, however, with the beginning of the Roman period, when bilingualism started to develop in greater numbers especially in Fayyum which hosted people from a wide variety of linguistic backgrounds: Roman army soldiers from all over the empire, probably Greek immigrant families carrying on the family lines rooted there by the Ptolemaics, and a mixture of Egyptian labour workers from everywhere in Egypt. Greek was the *lingua franca* in this situation, and the scribes were dependent on learning Greek for their work to be able to deal with administration. Therefore, some nonstandard variants are based on how Greek was written; hypercorrective forms could have Greek graphemes that were elsewhere replaced with those more suitable for the native language of the scribes. Some are phonological transfer coming from Egypt, for example the highly frequent underdifferentiation of voiced and voiceless Greek stops, as well as the stress-related phonemic transfer regarding the realisation of the round vowels, a feature that was an actual prosodic rule in Coptic.

On the other hand, some variation is clearly based on how the spoken level of the language was heard. Under this category falls e.g. the word-final schwa and fluctuation of the front vowels according to the consonantal environment. It is natural that there would be some native language transfer in the second language spoken by the scribes, but what makes it even more interesting is that what we see in writing in e.g. the Narmouthis ostraca is so much affected by the phonological system of Egyptian that it must be based on how the writers perceived it. This can have two reasons, of course: either it is just the effect of the native language prosodic system and replacement and underdifferentiation of foreign phonemes when repeating the foreign language, not quite reaching the target as described in Section 4.3.2.1, or it is in fact perception on how the language was spoken by also other users of it. It is possible that a local variety had developed.

I believe that the variation was mostly phonetic in nature for two reasons. First, Greek had in the Roman period become a deep orthography as described in Section 3.2 with a less than optimal relation between the graphemes used for writing and the phonetic form they represented in pronunciation. This is much like the situation of English and French in the contemporary world, with second language users and native speakers alike producing spelling errors all over the world. Second, Greek in Egypt was used by people with greatly varying skills of writing. The less experience with writing, the more spelling mistakes seems like a reasonable summation of the situation, and with numerous people without ability to write at all, even the less educated scribes could easily find employment. Again this is in no way dissimilar to any bilingual situation in the world, as proven by the English text messages by a native Arab speaker in Section 1.4.2.

To sum up, the variation is mainly phonetic in nature with the governing role of Coptic phonological system behind it. Orthographic conventions have a small role in the process, but first and foremost this is a matter of listener perception in especially contact situations between unrelated languages where language-internal sound changes related to e.g. regularisation of paradigms and spelling pronunciation are excluded (see e.g. Ohala 1981 and an update in 2012 for the meaning of this in sound change). Along with other phonetic research, this is a line of research worth pursuing in the future. Languages are spoken, and foreign languages are learned by hearing and listening to them. The results gained here enable a more detailed study in future with a larger sample than that studied preliminarily in Section 5.3, explained in more detail below.

Egyptian Greek variety

The Greek spoken during the Roman period in Egypt has been an immensely fruitful subject for a contact-linguistic topic. It included a period of intensifying of the Greek phonological developments, most important of which for this study is the raising and fronting of vowels. That combined with the native language transfer from the Egyptian writers has created a very interesting combination of a Greek variety that seems to have enough features to hold it distinct from mainland Greek. Therefore, in the last chapter, Section 5.3, I extended my hypothesis to analysing Greek in corpora other than OGN I (the Narmouthis Greek collection), and found the same nonstandard, Egyptian-influenced features in other parts of Egypt as well. Particularly the reduction of word-final vowels seems to have spread to a broader Greek using community including even non-Egyptian writers which is interesting as word-final vowels were functionally important for Greek morphological coding. It seems that some form of an independent variety of Greek had developed in Egypt, perhaps similar to Indian English.

Based on the analysis above, combined with the previous research of nonstandard orthography tied to the phonological system of Coptic by Gignac (1976, 1989, 1991) and Horrocks (2010), I believe there are grounds to treat the Greek spoken in Egypt as an independent variety similar to e.g. Indian English or American English. Variation was probably most prominent on the level of phonology, although some morphosyntactic levelling and genuine transfer has also been shown by e.g. Gignac (1981), Leiwo (2003, 2010, forthc.), Vierros (2003, 2007, 2012) and Stolk (2015); of course, the lexicon is a little studied level of language use which might reveal independent developments of Koine and post-Koine Greek in Egypt. The study of an Egyptian Greek variety will continue post-doc.

Transfer of Coptic orthographic conventions?

While analysing Coptic phonology with the only source available, the written text, I could not help but notice that same-alphabet transfer such as described in Section 3.3 from L1WS to L2WS seemed to be taking place in many of the Greek texts in Egypt that simultaneously carried evidence of Egyptian phonological transfer. For instance, Italian and English both use the Roman alphabet for writing but there is still native language phonological and orthographic transfer visible in e.g. treating the vowel qualities differently because Italian has a more accurate phoneme-to-grapheme correspondence than English. The same situation seems to have been happening in some Greek texts in Egypt.

The Narmouthis collection is, as mentioned, bilingual with Demotic and Greek-Demotic documents in addition to the ones analysed here. Coptic was strictly speaking early for writing but some preliminary efforts exist, and some of these come from the Narmouthis Hieratic documents, probably written by the same scribes that wrote the Greek ones. It does not, therefore, seem unfeasible to think that the scribes in Narmouthis probably knew how to write (Old) Coptic in addition to Demotic, especially since they obviously could write Greek with the same alphabet. Coptic proper later on created some orthographic practices that Greek did not have, for instance to do with the distinguished use of <ei> and <i>, both pronounced /i/ at this time so the difference seems to have been mainly graphemic (cf. Layton 2001: 17-18). There seems to be an excessive use of this and other Coptic orthographic practices in the Greek of Egypt. For example, in the Narmouthis ostraca e.g. *gitōnos* has a nonstandard word-final <o> possibly because of Fayyumic Coptic orthographic conventions as discussed in Section 5.1.2. In the Greek loanwords discussed in Section 5.1, there is for example the nonstandard form *lebenous* from the Greek standard *líbanos*, which is more a reflection of Coptic phonological rules and phonetic reality than of anything to do with Greek orthography, or *stoullous* from Greek *stýlos*, the writing being in Greek but the unstressed syllable displaying Coptic phonemic distribution (also an orthographic convention), and the first syllable underdifferentiation (a phonological phenomenon).

The same type of phono-orthographic variants exist in contact situations between other languages as well, in the ancient world and the modern one. For example, Nick Zair (2013) has written about similar findings in the contact between Oscan and Greek in Italy, in which Greek and Oscan spelling conventions are freely mixed together, both of the languages using the Greek alphabet; sometimes it is evident that the writer knew how to write Greek better than Oscan and possibly even spoke Greek better. There is an interesting example of a 300 BCE inscription of two words scribbled around the rim of a plate: πλατωρ ουψε <Platōr oup^{s}e> i.e. 'Plator made this' in Oscan. There is also another signature by the same person in Greek, saying πλατωρ εποι[η]σε < Platōr epoi[ē]se>, 'Plator made this'. In the Oscan one, there is confusion in the verbal ending with the standard required Oscan 3rd sg. perfect ending /-ɛd/ being replaced with the Greek 3rd sg. aorist ending /-e/ in *oup^{s}e*; furthermore, Oscan orthography had a single grapheme for /uː/ which is needed in the same word, but Plator is using the Greek equivalent, <ou> /u/, perhaps because he was more used to writing Greek. Plator might also have tried for a phonetic representation: Oscan /u/ might have been phonetically closer to Greek [o] than [u], making Greek <ou> a better match for it than <y>, which reflected /y/. (Zair 2013: 220, and fn9).

There is a good parallel example of what has been discussed here in an ongoing language contact in the 'hybrid' forms studied by Christopher G. Brown & Brian D. Joseph (2013) in the Greek usage of Southern Albania. The level is phonological instead of graphemic as in the historical contact situations described here; nevertheless it gives insight to how orthographic conventions are probably born: first there is the level of phonological transfer from L2 in the loanwords used, combined with the adaptation of the form to match the L1 phonological system.

In for example the Greek word οικονομική κρίση <oikonomikē krisē> /ikonomiki krisi/ 'the financial crisis', the Albanian version is εκονομική κρίση <ekonomikē krisē> /ekonomiki krisi/ with the first word's first syllable /i/ (written in standard Modern Greek with <oi>) been replaced with /e/. According to Brown & Joseph, this is because in Albanian, there is /e/ in the native language equivalent, *ekonomik* 'economic'. The same thing has happened to the word ελλενικά <ellenika> /ellenika/ vs. the Standard Modern Greek ελληνικά <ellēnika> /ellinika/ because in the Albanian word for 'Hellenic' *elenik*, there is /e/ in both syllables. Instances of these types of phonologally-based forms have ended up in e.g. gravestones (Joseph, p.c.). Examples such as these can be found in many Coptic texts where the Greek loanword has received native language phonological adaptation, in these historical circumstances reflected on the written level.

These findings of quite similar linguistic circumstances and with equally multicausal results of the language contact open up fresh research opportunities for studying the possibility of Coptic orthographic transfer alongside the phonological impact, something that has not been done before partly because the time period discussed in this book has been considered too early for studying Coptic writing. Essentially these types of mixed forms display characteristics of the *interlanguage* phenomenon that often is a part of second language usage, as discussed in Section 4.1. The discussion of this topic will be continued in Dahlgren (in prep. (a)).

The studying of this material has allowed me to dwell in the context of text linguistics with these two dead languages, once spoken aloud, now only available for research in written form. Still, they have been treated in this study and the next ones as the living languages they once were with an enormous amount of variation and contact features; considered in the way they were spoken by the people in the language contact situation I have written about and analysed. With a little help from modern phonetic research I have managed to almost hear these languages whose speakers are long gone but whose words remain. I have enjoyed hearing those words with all their phonological and phonetic features, mixed together as happens when people and languages meet.

References

The Greek documentary papyri can be found by their abbreviations in the *Checklist of Editions of Greek, Latin, Demotic and Coptic Papyri, Ostraca and Tablets (Web edition).* http://library.duke.edu/rubenstein/scriptorium/papyrus/texts/clist.html.

Literature on Narmouthis ostraca

OGN I = Pintaudi, Rosario & Pieter J. Sijpesteijn. 1993: *Ostraca greci da Narmuthis (OGN I).* Quaderni di Medinet Madi 2. Pisa: Giardini Editori e Stampatori in Pisa. = O.Narm.I in *Checklist.*

ODN = Bresciani, Edda, Sergio Pernigotti, Maria C. Betrò, Paolo Gallo & Angiolo Menchetti (eds.), *Ostraca demotici da Narmuti.* Quaderni de Medinet Madi 1. Pisa: Giardini Editori e Stampatori in Pisa.

Corrections on OGN I

Messeri, Gabriella & Rosario Pintaudi. 2001. Corrigenda ad OGN I. *Aegyptus* 81. 253 -282.

Coptic manuscript editions

Alexander Romance = von Lemm, Oscar. 1903. *Der Alexanderroman bei den Kopten. Ein Beitrag zur Geschichte der Alexandersage im Orient.* St. Petersburg.

BL Or. 11173(2) = Schenke, Hans-Martin. Mittelägyptische "Nachlese" II. Ein Privatbrief im mittelägyptischen Dialekt des Koptischen [P. BL OR 11173(2)]. In *Zeitschrift für Ägyptische Sprache und Altertumskunde* 119. 43–60.

BL Or. 4866 = Crum, Walter E. 1912. *Koptische Rechtsurkunden des achten Jahrhunderts aus Djême (Theben)*. Leipzig.

Codex Schøyen = Schenke, Hand-Martin. 2001. *Coptic papyri. Vol. 1, Das Matthäus-Evangelium im mittelägyptischen Dialekt des Koptischen (Codex Schoeyen)*. Oslo: Hermes.

O.Frangé 8 = Boud'hors, Anne & Chantal Heurtel. 2010. *Les ostraca coptes de la TT 29. Autour du moine Frangé. vol. 1 Textes.* Études d'archéologie Thébaine 3. Bruxelles: CReA-Patrimoine.

P. Bodmer VI = Kasser, Rodolphe. 1960. *Papyrus Bodmer VI. Livre des proverbes.* Corpus Scriptorum Christianorum orientalium: 194. Louvain.

P. Carlsberg 180, *P.Berlin* 10465 & *PSI* I 76 = Osing, Jürgen. 1998. *The Carlsberg papyri 2. Hieratische Papyri from Tebtunis.* Vol. 1. CNI Publications 17. Copenhagen: Museum Tusculanum Press, University of Copenhagen.

P. Hamb.bil. 1 = Diebner, Bernd J. & Rodolphe Kasser (eds.). 1989. *Hamburger Papyrus bil. 1. Die alttestamentlichen Texte des Papyrus Bilinguis 1 der Staats- und Universitätsbibliothek Hamburg: Canticum canticorum (coptice), Lamentationes Ieremiae (coptice), Ecclestiastes (graece et coptice)*. Genève: Cramer.

P. Mich 3520 & *P.Mich* 6868(a) = Schenke, Hans-Martin & Rodolphe Kasser (eds.). 2003. *Papyrus Michigan 3520 und 6868(a): Ecclestiastes, Erster Johannesbrief und Zweiter Petrusbrief im fayumischen Dialekt.* Berlin: De Gruyter.

Vatican MS Copticus 69 = Zaborowski, Jason R. 2005. *The Coptic martyrdom of John of Phanijōit: assimilation and conversion to Islam in thirteenth-century Egypt.* Leiden: Brill.

Dictionaries, grammars and reference works

Oxford English Dictionary Online, accessed 29th April & 9th May 2017.
http://www.oed.com/

Černý = Černý, Jaroslav. 1976. *Coptic etymological dictionary*. Cambridge: Cambridge University Press.

Crum = Crum, Walter E. 1939. *A Coptic dictionary*. Oxford: Oxford University Press.

LSJ Online = *The online Liddell-Scott-Jones Greek-English lexicon.*
www.tlg.uci.edu/lsj

Demotische Grammatik = Spiegelberg, Wilhelm. 1925. *Demotische Grammatik.* Heidelberg: Carl Winters Universitätsbuchhandlung.

Demotisches Namenbuch = Lüddeckens, E. (unter Mitarbeit von W. Brunsch, H.-J. Thissen, G. Vittman, K.-Th. Zauzich). 1985. *Demotisches Namenbuch.* Band I, Lieferung 5 *pꜣ-tj-wp-wꜣ.wt – pa-nfr.* Wiesbaden: Dr. Ludwig Reichert Verlag 1980-2000.

Namenbuch = Preisigke, Friedrich. 1922. *Namenbuch enthaltend alle griechischen, lateinischen, ägyptischen, hebräischen, arabischen und sonstigen semitischen und nichtsemitischen Menschennamen, soweit sie in griechischen Urkunden (Papyri, Ostraca, Inschriften, Mumienschildern usw.) Ägyptens sich vorfinden.* Heidelberg: Selbstverlag des Herausgegebers.

VISK = Hakulinen, Auli, Maria Vilkuna, Riitta Korhonen, Vesa Koivisto, Tarja Riitta Heinonen ja Irja Alho. 2004. Iso suomen kielioppi. Helsinki: Suomalaisen Kirjallisuuden Seura. Verkkoversio, accessed 19th September 2016. http://scripta.kotus.fi/visk URN:ISBN:978-952-5446-35-7

Vycichl, Werner. 1983. Dictionnaire étymologique de la langue copte. Leuven: Peeters.

Wörterbuch$_1$ = Preisigke, Friedrich & Emil Kiessling. 1931. *Wörterbuch der Griechischen Papyrusurkunden. Mit Einschluss der griechischen Inschriften Aufschriften, Ostraca, Mumienschilder usw. aus Ägypten.* III Band *(Besondere Wörterliste).* Berlin: Selbstverlag der Erben.

Wörterbuch$_2$ = Kiessling, Emil & Winfried Rübsam. 1971. *Wörterbuch der Griechischen Papyrusurkunden. Mit Einschluss der griechischen Inschriften Aufschriften, Ostraca, Mumienschilder usw. aus Ägypten.* Supplement 1 *(1940-1966).* Amsterdam: Verlag Adolf M. Hakkert.

Bibliography

Adams, J. N., Mark Janse, Simon Swain (eds.). 2002: *Bilingualism in ancient society: Language contact and the written text.* Oxford: Oxford University Press.

Allen, James P. 2010. *Middle Egyptian. An introduction to the language and culture of hieroglyphs.* Cambridge: Cambridge University Press.

Allen, James P. 2013. *The Ancient Egyptian language: An historical study.* Cambridge: Cambridge University Press.

Alston, Richard. 1995. *Soldier and society in Roman Egypt. A social history.* London: Routledge.

Altendorf, Ulrike. 2003. *Estuary English: Levelling at the interface of RP and South-Eastern British English.* Tübingen: Gunter Narr.

Amstutz, H., A. Dorn, M. Müller, M. Ronsdorf & S. Uljas (eds.). *Fuzzy boundaries. Festschrift für Antonio Loprieno* I. Hamburg: Widmaier Verlag.

Anderson, John M. 2007. *The Grammar of names*. Oxford: Oxford University Press.

Arai, Takayuki. 1999. A case study of spontaneous speech in Japanese. In *Proceedings of the International Congress of Phonetic Sciences (ICPhS),* 615-618. Berkeley, CA: Department of Linguistics, University of California.

Aro, Mikko. 2004. Learning to read. The effect of orthography. University of Jyväskylä, Doctoral dissertation.

Auer, Peter. 2001. Silben- und akzentzählende Sprachen. In Martin Haspelmath, Ekkehard König, Wulf Oesterreicher & Wolfgang Raible (eds.), *Language typology and language universals. An international handbook*, 1391-1399. Berlin: De Gruyter.

Bagnall, Roger S. 1993. *Egypt in Late Antiquity.* Princeton: Princeton University Press.

Bagnall, Roger S. & Dominic W. Rathbone. 2004. *Egypt from Alexander to the early Christians. An archaeological and historical guide.* London: The British Museum Press.

Bagnall, Roger S. 2000. The Fayum and its people. In Susan Walker & Morris Bierbrier (eds.), *Ancient faces. Mummy portraits from Roman Egypt*, 17 -20. New York: Routledge.

Bagnall, Roger S. 2007. Reflections on the Greek of the Narmouthis Ostraca. In Mario Capasso & Paola Davoli (eds.), *New archaeological and papyrological researches on the Fayyum, Proceedings of the International Meeting of Egyptology and Papyrology, Lecce, June 8th-10th 2005*, 14-21. *Papyrologia Lupiensia* 14.

Bagnall, Roger S. & Raffaella Cribiore. 2006: *Women's letters from Ancient Egypt, 300 BC – AD 800.* Ann Arbor: University of Michigan Press.

Baines, John, Jaromír Málek, & Graham Speake. 2000. *Cultural Atlas of Ancient Egypt*. New York: Checkmark.

Bauer, Winifred A. 1981. *Aspects of the grammar of Maori*. Edinburgh: University of Edinburgh.

Beddor, Patrice Speeter. 1983. Phonological and phonetic effects of nasalization on vowel height. Indiana University, doctoral dissertation.

Blau, Joshua. 1979. Some observations on a Middle Arabic Egyptian text in Coptic characters. *Jerusalem Studies in Arabic and Islam* 1. 215-262.

Boud'hors, Anne. 2017. Greek loanwords in Fayyumic documentary texts. In Eitan Grossman, Peter Dils, Tonio Sebastian Richter & Wolfgang Schenkel (eds), *Greek influence on Egyptian-Coptic. Contact-induced change in an ancient African language* 423-439. DDGLC Working Papers 1. Lingua Aegyptia, Studia Monographica 17.

Brown, Cristopher G. & Joseph D. Brian. 2013. The texture of a linguistic environment: New perspectives on the Greek of Southern Albania. In Aristotel Spiro (ed.), *Papers from the First International Conference of Greek-Albanian Studies, Tirana, Albania, March 24-25, 2012.* Albano-Hellenica 5, 145-152.

Bybee, Joan. 2008. Formal universals as emergent phenomena: The origins of structure preservation. In Jeff Good (ed.), *Linguistic universals and language change*, 108-121. Oxford: Oxford University Press.

Carignan, Christopher, Ryan Shosted, Maojing Fu, Zhi-Pei Liang & Bradley Sutton. 2013. The role of the tongue and pharynx in enhancement of vowel nasalization: A real-time mri investigation of French nasal vowels. In *Interspeech 2013*, *14th Annual Conference of the International Speech Communication Association, Lyon, France, August 25-29, 2013,* 3042-3046. ISCA Archive, http://www.isca-speech.org/archive/interspeech_2013,

Chirrey, Deborah. 1999. Edinburgh: Descriptive material. In Paul Foulkes & Gerard Docherty (eds.). *Urban voices: Accent studies in the British Isles,* 223-229. London: Arnold.

Choat, Malcolm. 2006. *Belief and cult in fourth-century papyri.* Studia Antiqua Australiensia. Turnhout: Brepols.

Clarysse, Willy. 1987. Greek loan-words in Demotic. In S.P. Vleeming (ed.), *Aspects of Demotic lexicography. Acts of the second international conference for Demotic studies*, *Leiden, 19-21 September 1984,* 9-33. Studia Demotica I. Leuven: Peeters.

Clarysse, Willy. 1993. Egyptian scribes writing Greek. In *Chronique d'Egypte* 68. 186-201.

Clarysse, Willy. 1997. Greek accents in Egyptian names. *Zeitschrift für Papyrologie und Epigraphik* 119. 177-184.

Clarysse, Willy. 1998. Ethnic diversity and dialect among the Greeks of Hellenistic Egypt. In A.M.F.W. Verhoogt & S.P. Vleeming (eds.), *The two faces of Graeco-Roman Egypt. Greek and Demotic and Greek-Demotic texts and studies presented to P.W. Pestman*, 1-13. Leiden: Brill.

Clarysse, Willy & Dorothy J. Thompson. 2006. *Counting the people in Hellenistic Egypt. Vol. 2. Historical studies.* Cambridge: Cambridge University Press.

Cook, Vivian & Benedetta Bassetti (eds.). 2005. *Second language writing systems*. Clevedon: Multilingual Matters.

Cribiore, Raffaella. 1996. *Writing, teachers, and students in Graeco-Roman Egypt*. American Studies in Papyrology 36. Atlanta: Scholars Press.

Cribiore, Raffaella. 2001. *Gymnastics of the mind*. Princeton: Princeton University Press.

Dahlgren, Sonja. (in preparation (a)). Greek spelling errors based on Coptic orthographic conventions? A study of phono-orthographic transfer.

Dahlgren, Sonja. (in preparation (b)). The ins and outs of Coptic /h/: the nonstandard usage of /h/ in Greek loanwords in Coptic.

Dahlgren, Sonja. 2016 (a). Egyptian transfer elements in the Greek of Narmouthis ostraca. In Tomasz Derda, Adam Lajtar, Andrzej Mironczuk, Grzegorz Ochala & Jakub Urbanik (eds.), *The Proceedings of the 27th International Congress of Papyrology,Warsaw 29.07—3.08 2013:* Volume II: Subliterary papyri, Documentary Papyri, Scribal Practices, Linguistic Matters. *The Journal of Juristic Papyrology*, Supplement 28, 1257-1263. Warsaw: The Raphael Taubenschlag Foundation.

Dahlgren, Sonja. 2016 (b). Towards a definition of an Egyptian Greek variety. *Papers in Historical Phonology* 1. 90-108.

Dahlgren, Sonja & Martti Leiwo. (in preparation). Confusion of tense and modality? Impact of L1 phonological transfer on verb semantics.

DeFrancis, John. 1989. *Visible speech: the diverse oneness of writing systems*. Honolulu: University of Hawaii Press.

Depauw, Mark & Joanne Stolk. 2015. Linguistic variation in Greek papyri: Towards a new tool for quantitative study. In *Greek, Roman, and Byzantine Studies* 55. 196-220.

Depuydt, Leo. 1993. On Coptic sounds. *Orientalia* 63. 338-375.

Deterding, David. 2010. Variation across Englishes: Phonology. In Andy Kirkpatrick (ed.), The Routledge handbook of World Englishes, 385-399. Oxon: Routledge.

Dohlus, Katrin. 2005. Phonetics or phonology: Asymmetries in loanword adaptations–French and German mid front rounded vowels in Japanese. *ZAS Papers in Linguistics* 42. 117-135.

Draguet, René. 1960. *Index copte et grec-copte de la concordance du Nouveau Testament sahidique.* Corpus Scriptorum Christianorum orientalium: 124, 173, 183, 185. Louvain.

Evans, Trevor V. & Dirk D. Obbink (eds.). 2010. *The Language of the Papyri.* Oxford: Oxford University Press.

Evans, Trevor V. 2010. Standard Koine Greek in third century B.C. papyri. In *Proceedings of the Twenty-Fifth International Congress of Papyrology*, *American Studies in Papyrology (Ann Arbor 2010)*. Special Edition, 197–206.

Fewster, Penelope. 2002. Bilingualism in Roman Egypt. In J. N. Adams, Mark Janse, Simon Swain (eds.). 2002: *Bilingualism in ancient society: Language contact and the written text.* Oxford: Oxford University Press.

Fisher, Wolfdietrich. 2002. *A Grammar of Classical Arabic*. Yale Language Series. New Haven: Yale University Press.

Flemming, Edward. 2003. The relationship between coronal place and vowel backness. *Phonology* 20. 335-373.

Flemming, Edward. 2004. Contrast and perceptual distinctiveness. In Bruce Hayes, Robert Kirchner & Donca Steriade (eds.), *Phonetically-based phonology*, 232-276. Cambridge: Cambridge University Press.

Flemming, Edward. 2009. The phonetics of schwa vowels. In Donka Minkova (ed.), *Phonological weakness in English. From old to present-day English,* 78-98. Palgrave Studies in Language History and Language Change. New York: Palgrave Macmillan.

Friedman, Victor & Brian D. Joseph. (to appear 2019). *The Balkan languages*. Cambridge: Cambridge University Press.

Förster, Hans. 2002. *Wörterbuch der griechischen Wörter in den koptischen dokumentarischen Texten*. Texte und Untersuchungen zur Geschichte der altchristlichen Literatur. Archiv für die Ausgabe der Griechischen Christlichen Schrifsteller der ersten Jahrhunderte. Band 148. Berlin: Gruyter.

Gallo, Paolo. 1997. *Ostraca demotici e ieratici dall'archivio bilingue di Narmouthis II.* Quaderni di Medinet Madi 3. Pisa: Giardini Editori e Stampatori in Pisa.

Gaur, Albertine. 1995. Scripts and writing systems: A historical perspective. In Insup Taylor & David R. Olson, *Scripts and literacy. Reading and learning to read alphabets, syllabaries and characters*. Neuropsychology and Cognition, Vol. 7, 19-30. Dordrecht: Kluwer Academic Publishers.

Gignac, Francis T. 1976. *A grammar of the Greek papyri of the Roman and Byzantine periods.* Vol. I Phonology. Milano: La Goliardica.

Gignac, Francis T. 1981. *A grammar of the Greek papyri of the Roman and Byzantine periods.* Vol. II Morphology. Milano: La Goliardica.

Gignac, Francis T. 1989. Phonological phenomena in the Greek papyri significant for the text and language of the New Testament. In Maurya P. Horgan & Paul J. Kobelski (eds.), *To Touch the Text: Biblican and Related Studies in Honor of Joseph A. Fitzmyer, S.J.*, 33-46. New York: Crossroad.

Gignac, Francis T. 1991. Phonology of the Greek of Egypt, influence of Coptic on the. In Aziz S. Atiya (ed.), *The Coptic encyclopedia*. Volume 8 of 8, 71-96. New York: Macmillan Publishers.

Girgis, W.A. 1966. Greek loan words in Coptic (Part II). In *Bulletin de la Société d'Archéologie Copte* 18. 71-96.

Girgis, W.A. [Anba Gregorios]. 2010. *Greek words in Coptic usage* (edited by Monier Atia). Cairo: Egyptian Printing Co.

Grabe, Esther, and Ee Ling Low. Durational variability in speech and the rhythm class hypothesis. In *Papers in laboratory phonology* 7. 515-546.

Greenberg, Joseph H. 1990 [1962]. The interpretation of the Coptic vowel system. In Keith Denning & Suzanne Kemmer (eds.), *On language: selected writings of Joseph H. Greenberg*, 428-438. Stanford: Stanford University Press.

van Guilder, Linda C. 2007. *Cross-language perception in foreign name transcription.* Georgetown University, Doctoral dissertation.

Grossman, Eitan & Martin Haspelmath. 2015. The Leipzig-Jerusalem transliteration of

Coptic. In Eitan Grossman, Martin Haspelmath & Tonio Sebastian Richter (eds.), *Egyptian-Coptic linguistics in typological perspective.* Empirical Approaches to Language Typology 55, 145-153. Berlin: De Gruyter.

Grossman, Eitan & Tonio Sebastian Richter. 2017. Dialectal variation and language change: The case of Greek loan-verb integration strategies in Coptic. In Grossman, Eitan, Peter Dils, Tonio Sebastian Richter & Wolfgang Schenkel (eds.), *Greek Influence on Egyptian-Coptic: Contact-induced change in an ancient African language*, 207-236. DDGLC Working Papers I. Lingua Aegyptia, Studia Monographica 17. Hamburg: Widmaier Verlag.

Gussman, Edmund. 2002. *Phonology. Analysis and theory*. Cambridge: Cambridge University Press.

Haspelmath, Martin. 2015. A grammatical overview of Egyptian and Coptic. In Eitan Grossman, Martin Haspelmath & Tonio Sebastian Richter (eds.), *Egyptian-Coptic linguistics in typological perspective.* Empirical Approaches to Language Typology 55, 103-143. Berlin: De Gruyter.

Haugen, Einar. 1950. The Analysis of linguistic borrowing. *Language* 26(2). 210-231.

Hasitzka, Monika. 2007. Namen in koptischen dokumentarischen Texten. In

Vienna: ÖsterreichischeNationalbibliothek.

Henriksson, Erik, Sonja Dahlgren & Marja Vierros (in preparation). Orthographic variants and phonological change: A contextual search tool for Greek documentary papyri.

Hillenbrand, James M., Michael J. Clark & Terrance M. Neadrey. 2001. Effects of consonant environment on vowel formant patterns. *The Journal of the Acoustical Society of America* 109(2). 748-763.

Hoffmann, Charlotte. 1991. *An Introduction to bilingualism.* London: Longman.

Horrocks, Geoffrey C. 2010 [1997]. *Greek: A history of the language and its speakers.* Oxford: Wiley-Blackwell.

Janda, Richard D. & Brian D. Joseph. 2003. On language, change, and language change – or, of history, linguistics, and historical linguistics. In Brian D. Joseph & Richard Janda (eds.), *Handbook of historical linguistics*, 3-180. Oxford: Blackwell.

Joseph, Brian D. 1979. Irregular [u]'s in Greek. *Die Sprache* 25. 46-48.

Joseph, Brian D. 1982. Multiple causation in language contact change. Published in microfiche in ERIC (Educational Resources Information Center) Database by ERIC Clearinghouse on Languages and Linguistics, document #ED205021,17.

Kahle, Paul E. 1954. *Bala'izah. Coptic texts from Deir El-Bala'izah in Upper Egypt.* Vol. I. London: Oxford University Press.

Kasser, Rodolphe. 1991a. Dialects. In Aziz S. Atiya (ed.) In Aziz S. Atiya (ed.), *The Coptic encyclopedia*. Volume 8 of 8, 87-98. New York: Macmillan Publishers.

Kasser, Rodolphe. 1991b. Dialects, groping and major groups of. In Aziz S. Atiya (ed.), *The Coptic encyclopedia*. Volume 8 of 8, 97-101. New York: Macmillan Publishers.

Kasser, Rodolphe. 1991c. Fayyumic. In Aziz S. Atiya (ed.), *The Coptic encyclopedia*. Volume 8 of 8, 124-131. New York: Macmillan Publishers.

Kiparsky, Paul. 1973. The inflectional accent in Indo-European. In *Language* 49(4). 794-849.

Kroonen, Guus. 2013. *Etymological dictionary of Proto-Germanic*. Leiden Indo-European Etymological Dictionaries Series. Vol. II. Leiden: Brill.

LaCharité, Darlene & Carole Paradis. 2005. Category preservation and proximity versus phonetic approximation in loanword adaptation. *Linguistic inquiry*, 36(2). 223-258.

Ladefoged, Peter & Ian Maddieson. 1996. *The sounds of the world's languages.* Oxford: Blackwell Publishers Ltd.

Ladefoged, Peter & Sandra Ferrari Disner. 2012 (3). *Vowels and consonants.* Oxford: Wiley Blackwell.

Lambdin, Thomas O. 1958. The bivalence of Coptic Eta and related problems in the vocalization of Egyptian. In *Journal of Near Eastern Studies* 17(3). 177-193.

Laudenbach, Benoît. (to appear 2017). Ἀσπάζομαι Εὐπρέπειαν καὶ πάνταις. Lettre d'un fils à sa mère. In *Archiv für Papyrusforschung und verwandte Gebiete* 63(1).

Laver, John. 1994. *Principles of phonetics.* Cambridge: Cambridge University Press.

Layton, Bentley. 2000: *A Coptic grammar.* Porta Linguarum Orientalium. Wiesbaden: Harrassowitz Verlag.

Lawson, Eleanor, James M. Scobbie & Jane Stuart-Smith. 2013. Bunched /r/ promotes vowel merger to schwar: An ultrasound tongue imaging study of Scottish sociophonetic variation. In *Journal of Phonetics* 41. 198-210.

Leiwo, Martti. 2003. Scribes and language variation. In Pietilä-Castrén, Leena & Manna Vesterinen (eds.), *Grapta Poikila I. Papers and Monographs of the Finnish Institute at Athens* Vol. VIII, 1-11. Helsinki: Foundation of the Finnish Institute at Athens.

Leiwo, Martti. 2005. Substandard Greek. Remarks from Mons Claudianus. In Kennel, N.M. & Tomlinson, Jonathan E. (eds.), *Ancient Greece at the turn of the millennium. Recent work and future perspectives. Proceedings of the Athens Symposium 18-20 May 2001*, 237-261. Publications of the Canadian Archaeological Institute at Athens 4. Athens.

Leiwo, Martti. 2010. Imperatives and other directives in the letters from Mons Claudianus. In Trevor V. Evans & Dirk D. Obbink (eds.), *The language of the papyri*, 97-119. Oxford: Oxford University Press.

Leiwo, Martti (forthcoming). Confusion of mood and tense in Greek private letters of Roman Egypt. In Mark Janse & Klaas Bentein (eds.). *Linguistic variation and change: Tense, aspect and modality in Ancient Greek*. Amsterdam Studies in Classical Philology. Leiden: Brill.

Leonard, James M. 2014. *Codex Schøyen 2650: A Middle Egyptian Coptic witness to the early Greek text of Matthew's Gospel. A study in translation theory, indigenous Coptic, and New Testament textual criticism.* Leiden: Brill.

Leppänen, Ville. 2016. Gothic evidence for the pronunciation of Greek. Transcription comparison method. In *Journal of Historical Linguistics* 6(1). 93-113.

Lincke, Eliese-Sophia & Frank Kammerzell. 2012. Egyptian classifiers at the interface of lexical semantics and pragmatics. In Eitan Grossman, Stéphane Polis & Jean Winand (eds.), *Lexical semantics in Ancient Egyptian*, 55-112. Lingua Aegyptia, Studia Monographica 9. Hamburg: Widmaier Verlag.

Loprieno, Antonio. 1995. *Ancient Egyptian. A linguistic introduction.* Cambridge: Cambridge University Press.

Maclagan, Margaret. 2010. The English(es) of New Zealand. In Kirkpatrick, Andy (ed.), *The Routledge handbook of World Englishes.* 152-164. London: Routledge.

Macaulay, Ronald K. S. 1977. *Language, social class and education: A Glasgow study*. Edinburgh: Edinburgh University Press.

Maddieson, Ian. 2013. Consonant-Vowel ratio. In Matthew S. Dryer & Martin Haspelmath (eds.), *The World Atlas of Language Structures Online*. Leipzig: Max Planck Institute for Evolutionary Anthropology.

Major, Roy C. 2001. *Foreign accent: The ontogeny and phylogeny of second language phonology.* Second Language Acquisition Research Series. Mahwah: Lawrence Erlbaum Associates.

Markus, Manfred. 1994. From stress-timing to syllable-timing: Changes in the prosodic system of Late Middle English and Early Modern English. In Dieter Kastovsky (ed.), *Studies in Early Modern English*, 187-203. Berlin: Mouton de Gruyter.

Matras, Yaron. 2009. *Language contact*. Cambridge Textbooks in Linguistics. Cambridge: Cambridge University Press.

van Minnen, Peter. 1998. Boorish or Bookish? Literature in Egyptian villages in the
Fayyum in the Graeco-Roman Period. In *Journal of Juristic Papyrology* 28. 99-184.

Mohanti, Ajit K. 2006. Multilingualism of the unequals and predicaments of education in India: Mother tongue or other tongue? In Ofelia García, Tove Skutnabb-Kangas & María E. Torres-Guzmán (eds.), *Imagining multilingual schools*. *Languages in education and glocalization*, 262-79. Clevedon: Multilingual Matters.

Muhs, Brian. 1992. Demotic and Greek ostraca in the third century B.C. In Janet H. Johnson (ed.), *Life in a multi-cultural society: Egypt from Cambyses to Constantine and beyond.* Studies in Ancient Oriental Civilization 51, 249 -251. Chicago: The Oriental Institute of the University of Chicago.

Newton, Brian. 1972. *The Generative interpretation of dialect*. Cambridge: Cambridge University Press.

Nübling, Damaris & Renate Schrambke. 2004. Silben- versus akzentsprachliche Züge in germanischen Sprachen und im Alemannischen. In Elvira Glaser, Peter Ott & Rudolf Schwarzenbach (eds.), *Alemannisch im Sprachvergleich. Beiträge zur 14. Arbeitstagung für alemannische Dialektologie in Männedorf (Zürich) vom 16.-18.9.2002*, 280-320. Stuttgart: Franz Steiner.

Ohala, John. 1981. The listener as a source of sound change. In Carrie S. Masek, Roberta A. Hendrick, Mary Frances Miller (eds.), *Papers from the parasession on language and behavior*, 178-203. Chicago: Chicago Linguistic Society.

Ohala, John. 2012. In Maria-Josep Solé & Daniel Recasens (eds.), *The initiation of sound change: Perception, production, and social factors.* Current Issues in Linguistic Theory 323, 21-35.

Paradis, Johanne. 2001. Do bilingual two-year-olds have separate phonological systems? In *International Journal of Bilingualism* 5. 19-38.

Pearce, Mary. 2008. Vowel harmony domains and vowel undershoot. In *UCL Working papers in Linguistics* 20. 115-140.

Peperkamp, Sharon & Emmanuel Dupoux. 2003. Reinterpreting loanword adaptations: the role of perception. In Maria-Josep Solé (ed.), *Proceedings of the 15th International Congress of Phonetic Sciences: ICPhS 03, Barcelona 3-9 August* 2003, 367-370.

Pernigotti, S. 1984. Il "copto" degli ostraca di Medinet Madi, in *Atti del XVII Congresso Internazionale di Papirologia*, Napoli, 1984, II, 787-791. Napoli: Centro internazionale per lo studio dei papiri ercolanesi.

Pestman, Pieter W. 1993. *The archive of the Theban Choachytes (second century B.C.): A survey of the Demotic and Greek papyri contained in the archive*. Studia Demotica 2. Leuven: Peeters.

Peust, Carsten. 1999. *Egyptian phonology. An introduction to the phonology of a dead language.* Göttingen: Peust und Gutschmidt.

Protopapas, Athanassios & Eleni L. Vlahou. 2009. A comparative quantitative analysis of Greek orthographic transparency. In *Behaviour Research Methods*, 41(4). 991-1008.

Quaegebeur, Jan. Pre-Old Coptic. In Aziz S. Atiya (ed.), *The Coptic encyclopedia*. Volume 8 of 8, 190-191. New York: Macmillan Publishers.

Ray, John. 1994. Literacy and language in Egypt in the Late and Persian Periods. In Alan K. Bowman & Greg Woolf G. (eds.), *Literacy and power in the ancient world*, 51-66. Cambridge: Cambridge University Press.

Recasens, Daniel. 2006. Lingual coarticulation. In William J. Hardcastle & Nigel Hewlett (eds.), *Coarticulation. Theory, data and techniques,* 80-104. New York: Cambridge University Press.

Reetz, Henning & Allard Jongman 2009. *Phonetics. Transcription, production, acoustics, and perception.* Malden: Wiley-Blackwell.

Rennicke, Iiris. 2015. Variation and change in the rhotics of Brazilian Portuguese. University of Helsinki, doctoral dissertation.

Richter, Tonio Sebastian. 2000. Spätkoptische Rechtsurkunden neu bearbeitet (II): Die Rechtsurkunden des Teschlot-Archivs. In *The Journal of Juristic Papyrology* 30. 95-148.

Richter, Tonio Sebastian. 2006. Coptic, Arabic loanwords in. In Kees Versteegh (ed.), *Encyclopedia of Arabic language and linguistics,* Vol. I, 595-601. Leiden: Brill.

Richter, Tonio Sebastian. 2008 (2). *Rechtssemantik und forensische Rhetorik. Untersuchungen zu Wortschatz, Stil und Grammatik der Sprache koptischer Rechtsurkunden.* Wiesbaden: Harrassowitz Verlag.

Richter, Tonio Sebastian. 2009. Greek, Coptic and the 'language of the Hijra': the rise and decline of the Coptic language in late antique and medieval Egypt. In Hannah M. Cotton, Robert G. Hoyland, Jonathan J. Price, J. & David J. Wasserstein (eds.), *From Hellenism to Islam: Cultural and linguistic change in the Roman Near East*, 401-446. Cambridge: Cambridge University Press.

Richter, Tonio Sebastian. 2015. On the fringes of Egyptian language and linguistics. Verb borrowing from Arabic into Coptic. In H. Amstutz, A. Dorn, M. Müller, M. Ronsdorf, S. Uljas (eds.), *Fuzzy boundaries. Festschrift für Antonio Loprieno*, 227-242. Hamburg: Wiedmaier Verlag.

Richter, Tonio Sebastian. 2017. Borrowing into Coptic, the other story. Arabic words in Coptic texts. In Eitan Grossman, Peter Dils, Tonio Sebastian Richter & Wolfgang Schenkel (eds.), *Greek influence on Egyptian-Coptic*, 513-533. Lingua Aegyptia, Studia Monographica 17.

Royce, James R. 2008. *Scribal habits in early Greek New Testament Papyri*. New Testament Tools, Studies and Documents, Vol. 36. Leiden: Brill.

Rutherford, Ian C. 2010. Bilingualism in Roman Egypt? Exploring the archive of Phatres of Narmuthis. In Trevor V. Evans & Dirk D. Obbink (eds.). 2010. *The language of the papyri*, 198-207. Oxford: Oxford University Press.

Ryding, Karin C. 2005. *A reference grammar of Modern Standard Arabic*. Cambridge: Cambridge University Press.

Sawicka, Irena. 1997. *The Balkan Sprachbund in the Light of Phonetic Features*. Toruń: Energeia.

Scobbie, James. 2006. (R) as a variable. In Keith Brown (Editor-in-Chief), *Encyclopedia of language & linguistics, Second edition,* Vol. 10, 337-344. Oxford: Elsevier.

Selinker, Larry. 1972. Interlanguage. *International Review of Applied Linguistics* 10. 209–231.

Skeat, Theodore C. 1957. *The use of dictation in ancient book-production*. Oxford: Oxford University Press.

Stolk, Joanne. 2015. *Case variation in Greek papyri. Retracing dative case syncretism in the language of the Greek documentary papyri and ostraca from Egypt (300 BCE - 800 CE).* http://www.duo.uio.no

Strange, Winifred (ed.). 1995. *Speech perception and linguistic experience: Issues in cross-language research*. Baltimore: York Press.

Strange, Winifred & Valerie L. Shafer. 2008. Speech perception in second language learners: The re-education of selective perception. In Jette G. Hansen Edwards & Mary L. Zampini (eds.), *Phonology and second language acquisition.* Studies in bilingualism, 153-191. Amsterdam: John Benjamins Publishing Company.

Stuart-Smith, Jane. 1999. Glasgow: Accent and voice quality. In Paul Foulkes & Gerard Docherty (eds.). *Urban voices: Accent studies in the British Isles,* 201-222. London: Arnold.

Sylak-Glassman, John C. 2014. An emergent approach to the guttural natural class. In *Proceedings of the Annual Meetings on Phonology,* Vol. 1(1), 1-12.

Teodorsson, Sven.-Tage. 1974. *The phonemic system of the Attic dialect 400-340 BC. Göteborg*: Acta Universitatis Gothoburgensis.

Teodorsson, Sven.-Tage. 1977. *The phonology of Ptolemaic Koine.* Göteborg: Acta Universitatis Gothoburgensis.

Thomason, Sarah G. 2001: *Language contact. An introduction*. Edinburgh: Edinburgh University Press.

Threatte, Leslie. 1980. *The grammar of Attic inscriptions. Vol. 1, Phonology*. Berlin: De Gruyter.

Traunmüller, Hartmut. 1999. Coarticulatory effects of consonants on vowels and their reflection in perception. In *Proceedings from the XIIth Swedish Phonetics Conference,* 141-144.

Trudgill, Peter. 2003. Modern Greek dialects: A preliminary classification. In *Journal of Greek linguistics* 4(1). 45-63.

Turner, Eric G. 2016 [1968]. *Greek papyri*: *An introduction*. Princeton: Princeton University Press.

Unger, J. Marshall & John DeFrancis. 1995. Logographic and semasiographic writing systems: A critique of Sampson's classification. In Insup Taylor & David R. Olson (eds.), *Scripts and literacy. Reading and learning to read alphabets, syllabaries and characters*. Neuropsychology and Cognition, Vol. 7, 45-58. Dordrecht: Kluwer Academic Publishers.

Venezky, Richard L. 1970. *The structure of English orthography*. The Hague: Mouton.

Vierros, Marja. 2012. *Bilingual notaries in Hellenistic Egypt. A study of Greek as a second language.* Collectanea Hellenistica 5. Brussel.

Vierros, Marja. 2007. The language of Hermias, an Egyptian notary from Pathyris (c. 100 B.C.). In Bernhard Palme (ed.), *Akten des 23. Internationalen Papyrologen-Kongresses. Wien, 22.-28. Juli 2001,* Papyrologica Vindobonensia 1, 719-723. Wien: Austrian Academy of Sciences Press.

Vierros, Marja. 2003. Everything is relative. The relative clause constructions of an Egyptian scribe writing Greek. In Pietilä-Castrén, Leena & Manna Vesterinen (eds.), *Grapta poikila I. Papers and Monographs of the Finnish Institute at Athens* Vol. VIII, 13-23. Helsinki: Foundation of the Finnish Institute at Athens.

Vieru-Dimulescu, Bianca & Philippe B. de Mareüil. 2006. Perceptual identification and phonetic analysis of 6 foreign accents in French. In *Interspeech 2006 - ICSLP*, Ninth International Conference on Spoken Language Processing, Pittsburgh, PA, USA, September 17-21, 2006; ISCA Archive,http://www.isca-speech.org/archive/interspeech_2006, 441-444.

Vycichl, Werner. 1991. Etymology. In Aziz S. Atiya (ed.), *The Coptic encyclopedia*. Volume 8 of 8, 118-124. New York: Macmillan Publishers.

Watson, Janet C.E. 2002. *The phonology and morphology of Arabic.* The Phonology of the World's Languages. Oxford: Oxford University Press.

Weinreich, Uriel. 1968 [1953]. *Languages in contact. Findings and problems.* The Hague: Mouton Publishers.

Wiik, Kalevi. 1965. *Finnish and English vowels. A comparison with special references to the learning problems met by native speakers of Finnish learning English.* Turku: Annales Universitatis Turkuensis.

Wipszycka, Eva. 2010. The institutional church. In Robert S. Bagnall (ed.), *Egypt in the Byzantine world 300-700*, 331-349. Cambridge: Cambridge University Press.

Wohlgemuth, Jan. 2010. *A typology of Vvrbal borrowings*. Trends in Linguistics, Studies and Monographs 211. Berlin: Mouton de Gruyter.

Worrell, William H. 1934. *Coptic sounds.* University of Michigan Studies Humanistic Series, XXVI. Ann Arbor: University of Michigan Press.

Worrell, William H. 1937. Popular traditions of the Coptic language. In *The American journal of Semitic languages and literatures* 54(1). 1-11.

Worrell, William H. & Vycichl, Werner. 1942. Popular traditions of the Coptic language. In William H. Worrell (ed.), *Coptic texts in the University of Michigan collection*, 297-342. Ann Arbor: University of Michigan Press.

Wright, Laura. 2009. The languages of Medieval Britain. In Peter Brown (ed.), *A companion to Medieval English literature and culture c. 1350 - c.1500,* 143-158. Oxford: Wiley-Blackwell.

Zair, Nicholas. 2013. Individualism in "Osco-Greek" orthography. In Esther-Miriam Wagner, Ben Outhwaite & Bettina Beinhoff (eds.), *Scribes as agents of language change*, 217-26. Berlin: De Gruyter

Zharkova, Natalia. 2007. Quantification of coarticulatory effects in several Scottish English phonemes using ultrasound. In *QMU Speech Science Research Centre Working Papers,* WP-13.